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THE
Journal of Home Economics

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THE TEACHING OF HOME ECONOMICS AS A PROFESSION.

ELIZABETH C. CONDIT.

Jacob Tome Institute.

A profession is commonly regarded, whether from the purely personal point of view or in a general way, by its mercantile value, its congeniality, and the opportunity presented for service to society.

Much has been written of the teaching of Home Economics in our schools and colleges, and the need of it is so constantly and strongly demonstrated on every hand, that I shall consider its place in the school curriculum as established.

Does the teaching of Home Economics offer a fair return for the necessary time and money spent in preparation? The high school graduate must spend at least two years in a school of domestic science and if she is very young or immature or deficient in preparation three years. The average cost of tuition, living, etc., for such training, is about $1000. The minimum salary paid teachers of domestic science in the public schools is $500 a year, with the maximum about $2400. The demand for graduates from the domestic science schools still exceeds the supply and the kind of teaching offered varies from that of a teacher of cookery in the public schools and that of a dietitian who controls the diet kitchen in a hospital and teaches the nurses, to the housekeeper and public demonstrator. The number of subjects the teacher of Home Economics is called upon to teach is large, including any or all of the sciences, most of the arts, hygiene, household management, nutrition, etc.

A VIEW OF THE MAIN SEWING ROOM IN KAWAIAHAO SEMINARY OF HAWAII (see page 641).

One of the common difficulties confronting the instructor of Home Economics is the application of a science to the home problems, with students who have had no scientific training. All the help a teacher receives from the authorities is a stating of the problem, often indefinitely. For instance, some theorist or even a practical but not scientific school director wants the girls in school to have a course in the chemistry of cleaning. The Home Economics teacher with a full schedule and no accepted course to follow, must meet the problem as best she can. The chemistry of cleaning is, by the way, much more easily adapted to the limits of the class-room and time schedule, than are many other important household problems. Home Economics is in so unformed a condition as to offer great interest and scope for original work, especially in organizing and directing the details for class procedure and presentation.

Is the teacher of Home Economics a philanthropist? All economists teach that on the welfare, morality and health of the family depend the strength, solidity, and influence of the nation. The Home Economics teacher should be able to apply to the home the knowledge imparted by the other instructors. If she is the right kind of woman, she will soon be the adviser in many homes, for their problems will be brought her by the children from the mothers and by the mothers themselves. She is in a position to improve the sanitary conditions of the neighborhood by awakening public opinion, and all this is being done in a quiet way by every domestic science instructor who is at all true to her vocation.

The classes come to the Home Economics laboratory and class-room with strong interest. It is the very rare girl who is totally uninterested in the home problems or does not enjoy the activity of the laboratory. In a recent article[1] by Miss Elizabeth Kemper Adams she says:

"This leads me to the second way in which academic life of the college fails psychologically in the response called for in class procedure. It may be called a failure in method. In the first place, the class-room stimulations and responses are heavily of one type—the verbal, through speaking, reading and writing, seldom through other forms of action.

"The psychological processes involved are to a great degree those of acquisition, retention and reproduction, listening to lectures that lead to examinations. It is a closed circle, in which the student gives to the teacher and to the class what they already know or are supposed to know.

[1] *Educational Review*, 39 (1910), No. 3, p. 247, The Psychological Gains and Losses of the College Woman.

"It has been said that under no other circumstances would human beings submit to such intolerable boredom. All this vast and painful labor is supposed to be for the purpose of equipping students to meet in the best way the various experiences of life after leaving college. It is rather like giving a workman the tools of a skilled artisan and telling him to store them carefully until they become blunt and rusty."

Home life, food, clothing, spending one's income, are so much a part of life even during school age that the responses to the interests awakened in the Home Economics classes are prompt and the problems adaptable to the class room. If solved, the information is immediately useful to either the student or her family. Often the problem is only partly solved in the class-room and the interest of the discoverer is given to the work. With this interest comes the realization to the student of the necessity of drill to gain skill and speed in manipulation.

The teacher of Home Economics whose pedagogic training equals her scientific knowledge has an unbounded opportunity for educational work in a variety of directions.

It seems to me the future of the profession of the teaching of Home Economics now depends upon thorough training in psychology and in class-room methods and management. When the Home Economics instructor shows teaching skill equal to that of other teachers, her place, importance, and value to the school will be inestimable. The very importance of the training and the immediate use of the work present dangers to the school, and more thoroughly trained, sound thinkers familiar with the work, are needed to fix the scope and place of Home Economics in the average school curriculum.

These and many more possibilities add to the interest of the Home Economics teachers' work, give dignity to the profession, and prevent monotony.

METHODS AND DEVICES IN HOME ECONOMICS AS USED IN ROCKFORD COLLEGE.

MARY DAVOREN CHAMBERS, A.M.

Head of Department of Chemistry and Home Economics.

Though the problem of home management includes food, shelter, and clothing, and though our course is designed to cover all these phases of Home Economics, yet more and more every year do I find the food problem to dominate in importance. Hence, in this synopsis of our work in Rockford College, I will deal solely with the subject of food and nutrition.

Every year I find it necessary to vary the course—often to revolutionize it—adapting it to changes in the personnel of the class; to changes in the times, though the dominant thought of the times is always an economic one; and to changes in my own wish to emphasize, to accentuate, now one point, now another. Hence, though I shall attempt to describe the work as it was given last year, only one thing is absolutely sure about the work of next year, that of necessity it will be different.

We began our laboratory work by comparing raw tomatoes with baked tomatoes, raw bananas with baked bananas, baked potatoes with boiled potatoes, baked apples with steamed apples, and raw eggs and raw meat with eggs and meat cooked at different degrees of temperature. We found one generalization applicable to all the varying results, namely, that heat develops flavor, and that within limits the higher the temperature the more pronounced is the flavor. This, which may be called the fundamental principle of cookery, is at the basis of all our future work. Change in texture is also noted. Some original problems were given, *e.g.*, the students were asked what general methods they would use in the cooking, respectively, of sweet corn, peas, squash, onions, cabbage, and beets, in order to attain their aim, the lessening or the development of flavor in the dish. This work covered several lessons.

Next we studied the reaction of various foods to some of the "reagents" used in cooking, *e.g.*, water, acids, salts and sugar. We

boiled rice in our hard city water and in distilled water; we cooked potatoes, corn, and beans in strongly salted and in unsalted water; we cooked apples or preserved berries in water alone and in a heavy syrup; we used vinegar in making a ragout of tough meat. Original application is always demanded of the principles learned.

"Surprises" often meet the students on assembling, as when the question is asked, "How many of you drank coffee this morning at breakfast?" "What time did you drink it, at the beginning or end of the meal, or together with your muffins and eggs or bacon?" "Now let us see whether you ought to drink coffee until you are as old as I am, and having reached that age, at what time during the meal you should use it, and whether the time of taking coffee is a matter of any special importance?"

Chemistry and physics are correlated at every possible point. In the application of physics, the field is very broad; the various methods of applying heat to food, the conducting properties of various media, *e.g.*, dry or moist heat, the iron or the enameled skillet; why the iron gem pan brown the gems better than the agate gem pan, why the soapstone griddle need not be greased; whether the cake shall go on the top or on the bottom shelf of the oven first; why quick baking causes the muffins to run up into a point in the middle; where to place milk and onions in the same refrigerator—all these are questions to which physics can be made tributary. I have known some students to try to use coefficients of expansion in baking a pound cake and feel greatly the better for the exercise, at least. Of course they found, as the teacher long ago learned, that the mixture of food materials used in the food, prepared in the kitchen, does not usually expand according to coefficients of expansion calculated for one or two of its ingredients. However, the attitude of mind which tries to solve home problems by the aid of scientific data is worth cultivating and the student can be led to consider other and more possible and practicable applications of physics. Physical laws can be cited in accounting for the loss of nutrients by the process of osmosis in the "floating" or "fattening" of oysters in fresh or brackish water and in the removal of an excess of salt in the freshening of salt ham or fish by soaking and in numerous other household matters.

As a part of their work the students made fondant, this exercise coming soon after their elementary study of oxidizing and reducing agents in their chemistry class. On being asked to apply Trommer's test to the solution of the fondant and of the cane sugar used in making

it, they were able intelligently to observe that if a little cupric salt were added to the test tube containing the fondant, it would be changed to the cuprous form. Since nothing was present but the candy to cause this change the cooked fondant may be inferred to have acquired properties which the original sugar did not possess. On repeating the test using molasses candy, vinegar taffy, and some other forms of inverted sugar the generalization was reached that heat and water, or better heat and acids, acting on cane sugar, change more or less of it to a sugar which will reduce certain metallic salts in solution. The similar action of ptyalin on starch should be pointed out. All these observations can be made to lead far into the chemistry of the groups of sugars and the facts of carbohydrate digestion.

By the study of such everyday problems as how to clean a smoked asbestos mat, when to use agate or enameled utensils instead of ordinary iron or tin, how to raise the temperature of the inner contents of a double boiler, whether or not to use water from the kitchen boiler when making tea, how to prevent the discoloration of fruit after paring, how to devise freezing mixtures, etc., the students can be readily taught to appreciate the scientific factors involved and reach a reasonable solution.

In connection with the work in botany a study of the composition and structure of the vegetable products used as food provides material for broad application. For instance, the reason why the best part of a potato is commonly considered to be that nearest the skin may be explained by comparing the potato with a branch. The outer part of the potato would then correspond to the phloëm region of a branch which is particularly rich in the nutrient material required by the plant for its growth and development. The classification of potatoes with the Solanaceæ, a family containing poisonous members such as the nightshade, may serve as a striking example of the fact that closely related plants may differ widely in their properties and that some which are originally unpalatable or harmful, may be so changed by selection and cultivation that they are wholesome and valuable. In the case of potatoes, the circumstances should also be considered under which a poisonous constituent, solanin, which would normally occur in the green plant, may be feared in the tuber if the potatoes are not rightly grown or rightly cared for, though it should be said, in truth, that the danger of solanin posioning from potatoes is remote under ordinary circumstances. The tomato and eggplant may also be spoken of as interesting examples of plants of the same family as the potato which are wholesome articles of food, though in

each case harmful attributes have in the past been attributed to them, as for instance, by the persons who fancied some connection between tomatoes and the occurrence of cancer.

The above are some of the applications which can be made of the facts of botany. If the students should happen to study cryptogams at the time of the bread making lessons, that is, if the botany instructor touches on yeasts, molds and bacterias in the study of cryptogams, the student should be able to set a bread sponge with a better knowledge of what the use of yeast involves than would otherwise be the case and to have a better knowledge than otherwise of the nature of the ingredients which she must use to obtain good bread. The applications of data usually included in the students' work in bacteriology, including the processes of fermentation and sterilization to cooking problems, are obvious and need not be dwelt on further in this paper.

Physiological chemistry is one of the branches of science which may be made of the utmost help to the teacher. It is sometimes said that a cereal food at the beginning of breakfast indirectly prepares the stomach for the reception of steak or eggs which may be eaten afterwards. A reason commonly given is that the alkaline saliva introduced in the stomach as a result of masticating the cereal stimulates the abundance of secretion of the acid gastric juice. In the same way if the question of the reasonableness of such a combination as apple sauce and pork arises, a usual answer is that acids stimulate the secretion of the bile and bile acids which are needed in the digestion of fats. Before accepting such lines of reasoning, which were perhaps as reasonable answers as could be given a few years ago, the pupil should be made familiar with the results of the careful studies of the digestion which have been reported by Pavlov and others and should be taught something of the mechanism of digestion as explained by this work and something of the function of both psychic and chemical stimulants in the process of digestion.

From the attempt to make rennet custard in various ways the question may arise as to why rennet custard fails to solidify perfectly when made from a cup of cocoa in which the milk was necessarily cooked when the cocoa was made. Facts from physiological chemistry indicate that for the clotting of milk by rennin as well as for the clotting of blood by another enzyme the presence of lime salts in definite combination is necessary, and in the case under consideration these have been precipitated, that is, the right chemical combinations have been more or less upset in the boiling of cocoa before it was used for the custard.

Of course in all such work the students must be taught how difficult it is to be sure that one has all the facts needed to answer the question and must realize that the conclusions one can reach must in the nature of things be simply the best explanation one can offer in the study of problems which involve many matters which are very commonly still under investigations in the laboratory. In this way the danger of fostering the habit of hasty generalization may be avoided.

The student should also be impressed with the fact that inability to give definite answers to all questions which can be raised does not mean that they are useless questions or that the usual works of reference are silent on the matter either out of wilfulness or out of ignorance. It should rather be made clear to them that although it is only recently that the general subject of these home problems has received scientific study, yet much knowledge has been accumulated and additional information is accumulating rapidly, so that we may well hope that the mystery of yesterday may be the commonplace of tomorrow just as fermentation was a mystery until Pasteur and others made it clear to all.

The subject of dietetics covers an hour a week for three semesters and involves the study of the problems of diet for the normal adult, for the growing child, for the aged, and for the sick. Types of all common foods are studied from a chemical, physical and economic standpoint; in other words, from their protein content, their energy value, their utilization by the organism and their cost as related to their other qualities. Questions of composition are made familiar by the use of series of charts, graphically illustrating the proper amounts of materials representing water, protein, fats, carbohydrates and ash in the common food materials.

As an illustration of the bearing of other matters besides composition upon the relative value of food, the student compares the volume, cost, composition, and energy value of a pound of milk and a pound of oysters as follows:

Relative cost and nutritive value of milk and oysters

KIND OF FOOD.	VOLUME.	COST.	PROTEID.	FAT.	CARBO-HYDRATES.	ENERGY.
	Pints.	*Cents.*	*Ounces.*	*Ounces.*	*Ounces.*	*Calories.*
Milk	1	.025	1	0.65	0.75	375
Oysters	1	.20	1	.20	.50	225

From this comparison it may be seen that if we buy oysters we pay 20 cents for approximately the same amount of nutritive material which can be obtained for 2½ cents spent on milk at the prices assumed. What then justifies the purchase of oysters? Shall one pay 17½ cents extra just for the oyster flavor? It can be made clear to the pupil that something else is involved; for milk is well worthy of being regarded as a staple food when one recalls the numerous ways in which it can be used alone or in combination with other foods. It is for this reason that milk would naturally be used in our diet so much more abundantly than oysters even if the two were of the same cost as well as of approximately the same nutritive value pint for pint. The question of value involves other considerations, such as the psychic stimulation already referred to and what has been termed the "psychic income" of the newer school economists, that is, the pleasure-yielding property of delicate flavor. This is perhaps a new way of referring to an old idea for it seems literally as well as figuratively true that "man may not live by bread alone."

Pursuing the comparison of milk and oysters it may be pointed out that milk lacks the nucleo-proteids, chemically related to the purin bodies, which should be avoided by victims of uric acid while oysters contain these bodies, but if these matters are brought out the student should also be told that this whole question of uric acid-yielding bodies is regarded by the physicians as a problem of invalid dietetics rather than a problem for persons in normal health. The comparison of oysters and milk, however, may serve to introduce the question of acid-forming and base-forming elements of foods as set forth in the work of many physiological chemists, including among others the results of investigations which have been published by Prof. H. C. Sherman of Columbia University.

From the whole discussion we may decide that there is a time for milk and also a time for oysters as well as for sweetbreads, asparagus, and other more or less costly dainties, and that in the intelligent selection and combination of foods of different properties as well as different costs lies the art of preparing an acceptable and wholesome menu. These conclusions perhaps can not be said to be radically different from those which have been reached long ago without all the "labor and pain" of laboratory research and study, but at least it may be said that when they are thus reached we are better able to give a reason "for the hope that is in us."

Although in this study of the subject dietaries are planned by the

students for persons of different ages, occupations and income, care is taken to show them that, so far as everyday living is concerned, it is not essential that the diet should correspond absolutely with some dietary standard but rather that it should be in reasonable accord with such a standard when considered in long periods. Furthermore it is true that the calculation of the nutritive value of a diet affords the most convenient method of learning its character and may serve as an important basis for the selection and combination of foods in a reasonable way. If it were not for such uses, calculating the value of a diet would be little better than an academic exercise. Man's physical and mental nature is very complex and many factors influence the relish for different foods as well as their digestion and assimilation. It is, therefore, more important to understand the broad principles of dietetics than to attempt to acquire a set of rules for guidance in this important part of the household problem.

A LESSON IN COOKERY IN THE ELEMENTARY SCHOOL.

MRS. ALICE P. NORTON and MISS JESSIE P. RICH.[1]

Colonel Parker used to say to his faculty something like this: "I have no patience with any teacher who goes before his class without careful and detailed preparation for his lesson; and I have as little patience with one who really teaches as he had planned."

To make a plan for a cooking lesson is comparatively simple; to tell just what questions will be actually asked, what direction the discussion will take, how far the suggestions of the children will lead one, is quite another matter. To attempt to put in static form anything so dynamic as a cooking lesson almost necessarily means a failure to reproduce its real and vital points.

While the dish to be cooked remains as it was planned, the discussion of the how and why often leads to the emphasis of points or the trying of experiments that were not in the mind of the teacher to begin with. To inspire the children to express what lies within their own experience, to gain from them suggestions as to methods of work, to select from the many suggestions those that are really worth attention, to determine by discussion or experiment what ones are practical or preferable, all this means the power of adaptation, alertness, and good judgment. The inspiration for the best teaching must come from the stimulus of actual contact with the children.

In the elementary school of the College of Education of the University of Chicago, a lesson generally consists first of science work that forms the preparation for cooking, then of the actual carrying on of the cooking process, followed either in the cooking laboratory or the class room by the writing of the recipe used, usually in the words of the children. This by no means ends the matter, however. Frequently a whole series of science lessons is undertaken to answer questions that have arisen in the cooking laboratory, while reading lessons, number lessons, and writing lessons also find their inspiration there. The work is interwoven with almost every other subject in the school.

[1] Read at the Boston Meeting of the Educational Section of the American Home Economics Association, July 5, 1910.

The preparation for the lesson is often done on a different day from the cooking, since our periods are short. A lesson is here chosen that might be given to either the fifth or sixth grade.

The work of our fifth grade centers about colonial cooking, and has a direct connection with the history of that year. The children take up the typical food products, study their production and preparation, and in so far as possible, put themselves in sympathy with colonial times. Possibly more time is spent on corn as the staple article of diet than on any other one food stuff. Its use in the early period is contrasted with that of the present, and its value is compared with that of wheat. In discussing the various uses of corn meal the making of the breakfast muffin is mentioned by the children as a present use in many of their homes. When a little later, they begin some study of doughs and batters, and come to the making of muffins, they wish to try in them the substitution of corn meal for flour. The question then as it is presented to the class is this: Can we make muffins by using corn meal in place of flour? The problem is approached in various ways by different classes. One class proposed the following steps of investigation. First, we must know the requirements of a good muffin. Second, we must know how it is made. Third, we must try substituting corn meal for the wheat flour in the recipe. (A question here brought out the advisability of substituting by weight rather than by measure.) Fourth, we must compare the corn meal and the white flour muffin and if the corn meal is not so good as the other see if we can tell the reason by finding out the difference between white flour and corn meal.

Another class might approach the problem in this way: (1) Is corn flour like white flour? (2) How do they differ? (3) Will this difference prevent corn meal from making as good a muffin as white flour? (4) What special difference caused the difference in results if there was one?

Either method of approach brings out practically the same facts and calls for the same set of experiments. The first order of procedure seems somewhat preferable for a younger class as it brings the cooking first, and uses the experiment for the explanation of the results. With an older class it might be better to use the experiment to lead up to the cooking process. The lesson is here discussed with the first order suggested.

The knowledge available is that brought from daily experience at home, with some knowledge of proportions obtained from the making

of thinner batters. This information is gotten at and summed up by such questions as the following: Can you describe a good muffin? What materials are used in making muffins? (The list suggested is put on the board, and the essentials selected.) Will the mixture be thicker or thinner than the griddle cake? How much more flour will be needed?

The general proportions for muffins, formulated as far as possible by the children, are put on the board by the teacher as follows: 2 cups of flour; 4 teaspoonfuls baking powder; ½ teaspoonful salt; 2 tablespoonfuls sugar; 1 egg; 1 cup of milk; and 2 tablespoonfuls melted butter. Further questions are then asked, such as these: Why are the materials so grouped? How will you combine them? Why? What is going to make the muffins light? What recipe shall we use for the corn meal muffins?

Weighings are made to determine the comparative amounts, and it is found that 1½ cups of corn meal will take the place of 2 cups of flour.

The directions are written on the board, and the recipe divided, each child making a sixth, three or four using the corn meal, the rest making the white flour muffins. When the muffins are baked, a careful comparison is made of the two kinds. Those from the corn meal are found smaller, drier, less light, and very crumbly. An attempt is then made to see if any differences in the two flours can be found that will account for this. (Some or all of the following experiments may be used.)

Dough equal amounts of the two flours and wash in a bowl of clear water. A sticky elastic substance is found in the white flour. Possibly this substance is the cause of success in the muffins. Is it found in the corn? A few experiments to find its nature and value may be tried, as follows:

(1) Through a glass tube blow into the gluten.

(2) Drop a moist piece into hot deep fat. Try the same with moistened corn meal.

(3) In one glass mix a measured amount of flour and water, in another an equal measure of starch and water. Now pass into each a gas (carbon dioxide generated by acid poured over marble chips).

(4) Mix together baking powder, flour and water in one dish, in another baking powder, corn meal and water. Make a griddle cake from each. Notice and compare results.

In each case it will be seen that though gluten is not what makes foods light, it is capable of stretching and retaining a gas.

To return to the original question—Can we make muffins by putting corn meal in place of flour? We did not succeed; but we have corn meal muffins at home. How are they made? Perhaps we might use corn meal instead of part of the flour, leaving enough flour to furnish the necessary gluten. Some child might suggest the use of more eggs.

If the interest of the children has been sustained, a lesson may follow in which the substitution of corn meal for one-third, one-half, and two-thirds of the flour may be made and the results compared, till the proportions for the best muffins are found.

This by no means closes the work on gluten or flour or the lightening of doughs and batters. Instead it opens up many questions for further study.

It seems impossible to put the work on paper in a way that shows its interest and meaning. It is certainly true that the children respond to it with an enthusiasm and a suggestiveness often absent in other types of work. The boys especially respond with many questions about the why and the wherefore. This is often shown in their own accounts of what they have done. An illustration of this is given in the following paper by a fifth grade child summing up a different lesson, but one also involving experimental work:

We started out to make grape jelly, when some one asked whether it could be made without sugar. We tried many different ways. Some of us made it without any sugar, and some with one-fourth as much sugar. All jellied. I got four-fifths of a wine glass of jelly, using half a cup of juice and one-fourth of a cup of sugar.

One basket of grapes cost 20 cents; three-fourths of a basket of grapes cost 15 cents; we used three-fourths of a basket. There were fourteen children in the cooking class that day, and each one had half a cup of grape juice. One cup of grape juice cost $2\frac{1}{7}$ cents; one-half cup of grape juice cost $1\frac{1}{14}$ cents. In grape jelly there is also the sugar. The sugar cost $\frac{1}{4}$ cent and the sugar and juice together cost $1\frac{4}{7}$ cents.

HOW TO APPLY THE LABORATORY METHOD OF STUDY TO PRACTICAL COOKING IN HIGH SCHOOLS.[1]

CARLOTTA C. GREER.

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To develop reasoning power chemistry, physics and mathematics are used, but the textbooks were prepared by men to interest boys. Why should not girls' activities be utilized to interest them in the same principle, but with a different application? Girls as a rule are considered very unsatisfactory students of chemistry and physics, I once heard an instructor in chemistry say he had such a fine class this year, "all boys, not a single girl to bother with."

Problems involving terms of her experience and environment would certainly claim the girls' interest—I am quite sure that sugar and spice would be far more attractive to her than prisms, cones, and partial payments In the Cleveland Technical High School, girls solve problems involving the cost of foods; the relation of the nutritive value to the cost of food, and the method of preparation; comparison of one method of cookery with another, as to economy of time and fuel; division of quantities used in the ordinary recipe, in order that the student may appreciate the relation of the individual to the practical quantities; formation of recipes; and questions in household hygiene.

Data for these problems are obtained for the most part from observations and measurements made in the school kitchen. While skill is being acquired in preparing a food material in the kitchen laboratory, valuable information concerning the same food is received from propositions and solutions of mathematical problems. By way of illustration, a few of these applied problems are here reproduced, as follows:

(1) Coffee sugar is 98 per cent pure sugar, while granulated sugar is 100 per cent pure sugar. Coffee sugar costs 5½ cts. and granulated sugar 6 cts. per lb. Which is the cheaper?

[1] A condensation of a paper read at the Boston meeting of the Educational Section of the American Home Economics Association, July 8, 1910.

(2) Granulated sugar sells at 6 cts. per lb., or $1.45 for 25 lbs. If a family uses 4 lbs. of sugar per week, how much can be saved in a year by buying it in twenty-five pound quantities?

(3) A can of dried beef cost 15 cts. and contained 4.6 oz. of meat. Dried beef in bulk sold for 35 cts. per pound. How many ounces of beef in bulk could be purchased for 15 cts? What percentage is saved by buying it in bulk rather than in cans?

(4) A grown person needs 3000 cu. ft. of air per hour. If a room 14 by 12 by 10 ft. were occupied by one person, how often would the air have to be completely changed to obtain pure air?

(5) According to Fisher, one large egg and one shredded wheat biscuit each yield 100 calories of energy. The dietary standard for a girl of twelve years is 1276 calories. Assuming that the food at breakfast should produce one-third of this quantity, what part of it will be supplied by the biscuit and egg?

(6) How many potatoes are cooked in your home per day? There are 144 medium-sized potatoes in a bushel. How many bushels of potatoes are used in your home per month? When potatoes sell at 80 cts. per bushel, how much is spent for potatoes in your home during a month?

(7) A loaf of bread weighed 15½ oz. but after the crusts were removed it weighed 14½ oz. What percentage of the loaf was crust? If bread costs 5 cts. per loaf, what is the cost of the crusts? If a family uses 3 loaves of bread per week for toast from which the crusts are removed, how much would the waste amount to in a month, if the crusts were not utilized for other purposes? What percentage of the cost of the loaf would be waste?

(8) The proportions of baking powder, fat, moisture, and salt to flour, and of eggs to baking powder for batters and doughs are stated, then such a problem given as the following: Write a recipe for waffles, making them economical as well as palatable when eggs sell for 45 cts. per dozen, using 3 cups of flour for the basis.

(9) Counting fuel and cost of materials, 4 doz. cookies can be made for 31 cts. At the bakery cookies cost 10 cents per dozen. Find the difference in cost between "home made" and "bakery" cookies. To mix and bake 4 doz. cookies at home requires 2 hours. If a woman can earn 15 cts. per hour, is it cheaper for her to buy or make cookies? How much cheaper?

(10) Pea soup to serve six can be prepared from 1 can of peas costing 12 cts. or from 1 cup of split peas costing 6 cts. per lb. (1 lb. split

peas measures 2 cups). Fifteen minutes are required to cook the canned peas, and 3½ hours to cook the split peas. The simmering burner on which these goods should be cooked consumes 3.6 cu. ft. of gas per hour; gas costs 75 cts. per 1000 cu. ft. Which kind of peas is it cheaper to use?

An attempt is being made in the Cleveland High School to teach girls to cook by having them do much cooking and at the same time treat processes of cooking as experiments of an ordinary scientific subject. Writers of laboratory manuals of exact sciences aid beginners in developing skill in manipulation and powers of observation by not only giving directions for the methods of preparation of a substance, but also by inserting suggestions and questions which will cause the student to look for changes and draw conclusions as to their cause. In preparing oxygen, the student writes in his note book the method of preparation, and the appearance, properties, and behavior, when different materials come in contact with it. Our methods of teaching are analogous to those used in science laboratories, in that directions for methods of cooking foods are given, then suggestions and questions are added to aid the student in comprehending what she is doing and what is taking place. The observations made are recorded in a note book. In arranging our practical lessons, we have given such directions and questions as to have the student observe changes in foods as heat is applied, and make a comparison of one method of cookery with another, including the relative nutritive value from two methods of cooking the same foods.

A lesson on boiled and steamed rice, for instance, includes such directions as these: Compare the quantity of water used for boiling and steaming rice. Why is a larger amount used for boiled rice? How is rice tested for sufficient cooking? Why does it take rice a shorter time to cook than most of the wheat and oat foods? Test the water from boiled rice with iodine for starch. Which method of cooking rice leaves the more nutrition in the cooked product? What is the difference in appearance of steamed and boiled rice? What ingredient does rice contain which makes it possible to mold it? Which is better for molding—steamed or boiled rice? Why?

Here is a lesson on plain and whole-wheat biscuits in which some were made by using one-half cup of fat, and others by using two table spoonfuls of fat. Compare biscuits made with little fat, as to texture, appearance and taste, with those made with a greater quantity. What is the effect of increasing the quantity of fat? How much flour

was used for biscuits in this lesson? How many biscuits were made from this quantity? Note the quantity given in the practical recipe. How many biscuits will this make? Tabulate the chemical composition of white and whole wheat flour. On the basis of the table, which is the better tissue builder? Why? What is the weight of a sack of flour of ordinary size? How many cupfuls are contained in one pound of flour? What is the present market price per sack?

If a lesson is given in which it is necessary to do a little experimenting, aside from practical cooking, the students not only perform the experiment, but in a methodical way record the procedure, giving process, result and conclusions or practical applications of the experiment. Only such experiments are given as will demonstrate principles which can be directly applied to methods of cooking or digestion. The application is always made at once by practical work. During the first year, special stress is placed upon the function of foods and their digestibility to correlate with physiology and botany—the sciences required of freshman girls. From a lesson on sugar in which different kinds of sugar are dissolved that the student may comprehend what solution is, the application is at once made to digestion by developing the fact that digestion involves solution, and all foods must be dissolved or changed by a somewhat similar process before they can be assimilated. Experiments, when the subject of fat is given for a lesson, have later proved quite helpful to the immature students in getting some notions of fat digestion.

During the first year of the Cleveland Technical High School, there was a class of girls in applied chemistry who had had no training in domestic science. The work of this class and of the succeeding class to which one year's work in domestic science had been given was compared, and the conclusion made that the students of the second class were much more apt in grasping scientific study. It would seem, therefore, that we have somewhat accomplished an aim in not only teaching girls to cook, but in also laying the foundation for the laboratory method of study. If so, this is no small accomplishment. Obviously it is impossible for any school room to furnish the same environment or for any student to experience the same conditions as will be found in the various homes. The best the teacher can do to train the student to fill the responsibility of home keeping is to give her definite instruction in methods of housewifery and at the same time train her intellect to such resourcefulness that she may be able to master any situation, however trying.

HOW TO TEACH THE PREPARATION OF MEALS.[1]

FLORENCE WILLARD.

Washington Irving High School, New York City.

Many of the pupils who reach the high schools have had work in domestic science in the elementary school and the practical part of the course is sometimes a problem. As far as the mental development is concerned, the high school pupil is not very far in advance of the elementary pupil, and in the first years is not ready for experimental work in cooking. But psychologically she differs. She no longer cares to cook only one muffin or to boil one potato; she is no longer content to scrub and clean. She wants to feel that the work is in advance of the elementary work.

The pupils come to us with a fair knowledge of foods and the general methods of cooking. It seems to me that it is best to take advantage of this, and use the knowledge in the combination of foods for simple meals instead of going on in the realms of fancy cooking.

The usual cooking period is from 90 to 120 minutes long. To cook a meal in this time in a school kitchen is a difficult problem. It can be done, however, if carefully planned.

Most of the menus will have to be talked over in a previous lesson. At first they should consist entirely of things which the pupils know how to cook. When the pupils enter the room the menu should be on the black board, and the recipes written on the board or typewritten copies distributed.

There is no time for a lecture at the beginning of the lesson. A few general instructions will be necessary, but the pupil should begin work at once.

The proper distribution of supplies is most important. I have found that placing supplies in groups, where not more than four or five pupils use them, expedites matters a great deal. All lessons should finish in time for the pupil to compare and record results.

As has been suggested, begin with a simple menu. A breakfast is the best meal. The menu has been planned and consists, for example,

[1] Read at the Boston Meeting of the Educational Section, of the American Home Economics Association, July 6, 1910.

of stewed fruit, cereal, toast, eggs and coffee. Divide the class into groups of four or five, depending upon the size of the class. Have each group cooking one thing, using proportions large enough to serve the entire class with small servings. All this can be easily accomplished in the first lesson, but there will not be time to serve the breakfast properly. The serving of these breakfasts at the end of the cooking lesson amounts to each pupil setting an individual place for herself and being served by one pupil from each group.

A lesson should very soon be given where nothing is cooked, where the whole stress of the lesson is placed on the serving and where the pupils go through the actual process. Parts of the class act as host, hostess and guests, others take turn as servers. Lessons should also be given illustrating the home life where no maid is kept and no one person serves, except perhaps a younger member of the household.

At least three lessons should be devoted to cooking breakfast where the class is divided into groups of four or five. Change the arrangement each time, so that pupils who cook cereals one time cook eggs another, and so on. Follow these lessons with three lessons where the pupils cook in groups of two, with amounts large enough for two people. Change the menu each time, having a different fruit, different bread, etc. Do not change the method of cooking, however, except perhaps for the eggs.

Each pupil should now be ready to prepare a breakfast alone, using, for economy only, individual amounts. Two lessons are necessary to make each pupil thoroughly confident that she can prepare a breakfast entirely by herself. It is a good plan to follow this with a test breakfast, cooked and served for six people, dividing the work evenly among the pupils, the teacher being among the guests and giving no help whatever.

Luncheon, being another simple meal, should next be taught. Begin as with the breakfasts, cooking in groups of four or five Have the menu consist of cream of vegetable, lentil or split pea soups, biscuits, or some hot bread, and a beverage. Three lessons should be given where the pupils cook in groups of four or five, three lessons in groups of two, and two lessons where each pupil cooks alone. Vary the menu to include simple salads. Bread and rolls can be reviewed in the luncheon lessons if the classes work in rotation, one class making the dough, another baking it, etc.

The fancy methods of cooking vegetables, fried tomatoes, corn fritters, stuffed peppers, and fancy egg dishes, may be readily taught for the luncheon dishes.

Suppers are so nearly like luncheons that they follow next in order. Drop the soup from the menu and add a simple dessert, like cake, combining with the cake some of the preserves that adorn all of our exhibit cases. The biscuit dough may be turned into short-cake, Dutch apple cake, etc. As is always the case in cooking entire meals, there must never be but one new dish in each lesson.

Dinner, the most elaborate meal and requiring the greatest skill, is taken up last in the group. Here, if the classes work in rotation, a soup stock can be prepared by a previous class and used in the following classes:

The dinners will have to include the meat lessons. Begin as before, working in groups of four or five, then in twos and then individually. At the end an examination dinner should be cooked and served by the entire class. If the dinner of the day is to include broiled steak, and the pupils are working in groups of twos, cut the steak into two-inch squares, and have each two pupils broil the small pieces over the individual stoves. The same plan works with the roasts. Cut a roast into small pieces, divide them among the pupils, and have each pupil season and roast her piece in a small pan. Liver may be braised in this individual way surrounded by vegetables.

The soups, the desserts and the salads should all be reviews of the lunches and suppers. The constant repetition prevents cooking a great variety of dishes. The value lies in the pupil's being absolutely familiar with all the dishes prepared.

The clock must be constantly watched to accomplish the program planned for each lesson. One must work against time. Gauge the time it should take to accomplish a certain amount of work. Tell the class that it must be done in that time. This spurs on the slow pupils and keeps back the hustling, careless ones. If a class learns to work together much more can be accomplished. We work for speed in the Washington Irving High School in New York, and have many exercises called "speed tests." The first pupil to finish has the highest mark for speed and she is almost invariably one of the neatest and best workers as well.

Half of the women to-day spend too much time in housework; working slowly is a bad habit to contract. We all know housekeepers who have beautifully well managed and clean homes, and yet have plenty of time for outside work and social enjoyment. We also know housekeepers who are eternally at work and never have time for anything but to complain. We do not wish to train housekeepers of this type.

The cost of materials in teaching meals is an item to be considered. While it costs ordinarily two cents per pupil a lesson to teach domestic science, I have found that teaching meals in this way costs four cents per pupil a lesson. We have tried occasionally serving the meals to teachers and thus lessening the expense. That is only practical with the mid-day lesson, and the pupils always are disappointed, so we have not done much in that line. We never have any trouble in disposing of the food cooked; our pupils are always hungry. Most of them, if they get the chance, will eat their luncheon before ten o'clock.

It is often amusing to note the kind of food that is suggested when the menus are being planned. The most popular article for breakfast is chocolate cake. If one can stand it, I suppose it furnishes more calories than a roll, and is not any worse than pie; but as the average stomach cannot stand pie and cake for breakfast we endeavor to teach them that rolls are better. The dessert they always wish is ice cream, and although the Hebrew is not allowed oysters, "oysters on the half shell" is apt to be inserted in any menu written by the girls. "Demi-tasse" is always popular, and that no meal should ever be served without seltzer seems to be a rule in many households.

One of the advantages when entire meals are cooked is the skill that is acquired in manipulation. It is not of great value to know how to cook only one thing at a time, for the successful housekeeper must literally have many irons in the fire. She must learn to calculate for each dish that is to be cooked. Things must be started in proper rotation. The average pupil will prepare the coffee before the cereal, but she doesn't do it more than once. Preparing meals in the school kitchen also teaches economy in the use of cooking utensils, which is a valuable habit to acquire.

The planning of the meals reveals to our foreign pupils what Americans eat, and what they can conveniently buy. They cannot find their native foods here, and when they substitute American foods at their own discretion, they make many unhealthful combinations.

The home work during the entire course calls for the study of prices and amounts needed to be purchased. The recent meat wars in New York have made my pupils very keen on the cost of foods, especially substitutes for foods like meat at its present prices.

After pupils have an idea of what a meal should consist, a good basis has been formed to work out the actual amounts needed by the calorie calculations.

THE USE OF THE 100-CALORIE PORTION AS A CONVENIENT MEANS FOR CALCULATING THE FOOD VALUE OF A GIVEN DIET.

RACHEL H. COLWELL.

To Professor Fisher of Yale is due the suggestion of the 100-calorie portion. He has worked out[1] tables giving the weight, the approximate bulk and the calories derived from protein, fat, and carbohydrates in a 100-calorie portion of some of the common foods. By weighing and then measuring in the laboratory some of these 100-calorie portions we can obtain a practical notion of the relative calorific values of the different foods.

The use of these results enables us to approximate rapidly the number of calories of the food served at a given meal. As an example, take a breakfast, consisting of one large orange, one shredded wheat biscuit, ⅔ cup of milk, one large egg, one thick slice of bread (sufficient for two slices of toast), one tablespoon of butter for the toast, and five teaspoons sugar. Each of these items contains approximately 100 calories, making a total of 700 calories.

If it is desired to arrange a breakfast menu for six people it is merely necessary to take six 100-calorie portions instead of one.

Often one wishes to know the relation of the calories derived from protein to the total calories. That, of course, requires some calculation, but it can certainly be done more rapidly by this method. Let us take as an example the breakfast before us. In the case of the orange the table gives 6 calories from protein in a 100-calorie portion. Since the nutritive ratio is the relation of the number of calories of protein to those from the other nutrients, $100-6=94 \div 6=15+$, or the nutritive ratio of the orange is $1:15+$. Applying this to the whole breakfast and estimating the nutritive ratio of the entire meal for 6 persons instead of the individual portion, we have the results shown in the following table:

[1] Amer. J. Physiol. 15 (1906), No. 5, pp. 417–32; J. Amer. Med. Assn. 48 (1907), No. 16, pp. 1316–25; Bul. Amer. School Home Economic. Series 1, 1909, pp. 32.

Calculation by the 100-calorie portion method of the relative amounts of energy derived from protein in a typical breakfast for six persons.

KIND OF FOOD.	AMOUNT.	NUMBER OF 100-CALORIE PORTIONS.	TOTAL CALORIES.	CALORIES DERIVED FROM PROTEIN.
Oranges	6 large	6	600	36
Shredded wheat	6 biscuits	6	600	78
Milk	4½ cups	6	600	114
Eggs	6 large	6	600	192
Bread	6 thick slices	6	600	78
Sugar	5 teaspoons	6	600	—
Butter	6 level tablespoons	6	600	3
Total		42	4200	501

As 4200 total calories—501 calories from protein = 3699 calories and 3699 ÷ 501 = 7 +, the nutritive ratio = 1:7 +.

The same use of the 100-calorie portion may be made in determining the number of calories in a recipe. Take as an example a custard:

Calculation of the energy value of custard from the raw ingredients by the 100-calorie portion method.

KIND OF MATERIAL.	AMOUNT.	NUMBER OF CALORIE PORTIONS.	TOTAL CALORIES.	CALORIES DERIVED FROM PROTEIN.
Eggs	6	6	600	192
Milk	4 cups	6.4	640	122
Sugar	½ cup	4.8	480	480
Total		17.2	1720	314

As 1720 total calories − 314 calories from protein = 1406 calories, and 1406 ÷ 314 = 4+, the nutritive ratio = 1:4+. If the custard served six persons, then each one had nearly three 100-calorie portions.

In conclusion it seems fair to say that we must get away from detailed calculations with pencil and paper in our dietary work if we would make it of such practical value that it can guide the housekeeper in the collection and combination of food material for the family.

HOW TO USE THE 100-CALORIE PORTION IN DIETARY TEACHING IN HIGH SCHOOLS.[1]

MABEL WELLMAN.

In the first place we will suppose the class has had the usual training in cooking, understands what is meant by carbohydrates, fat and protein, and knows something of the chief functions of these as foods. In connection with the discussion of the use of foods to furnish energy there must be made clear that rather difficult point of what we mean by energy, the various manifestations of force, and how one of these can be transformed into another. If the class has had physics, they follow the idea readily, otherwise a good deal of illustration is needed. Then can be raised the question, to be answered by all the rest of the dietetic study—How can we know how much food to take, whether we have eaten enough, or too much, or if it has been made up of the right proportions of food materials?

That appetite is not and cannot be a safe guide can easily be established by a consideration of the way in which little children would satisfy their appetites if left to themselves. The class will readily see, too, that the amount of food necessary must differ from person to person with the individual need for energy: first, with the size of the body and the effect of temperature and clothing in influencing the heat loss; second, with the amount of work done, this meaning both amount of activity and the need of repair; and third, with age, since that modifies building requirements, repair and activity.

Now, we can suggest to the class the possibility of measuring all this in terms of heat, since a given form of energy is but one manifestation of force; then the measure of power to heat, or of fuel value, the large calorie, must be worked out. Next can be taken up the usual study of how we determine the needs of the body by both the statistical method and the "man-in-the-box" method. Whichever standard the teacher decides to give can follow at this point as usual—*only* the

[1] Presented at the Boston Meeting of the Household Arts Section of the American Home Economics Association, July 5-6, 1910.

standard should be translated into *calories* before being presented to the class, as they will have no need of knowing the standard in grams of protein, fat and carbohydrates. As the tendency of the day seems to be to give the standard only in protein and energy this still further simplifies the work. For example, Dr. Langworthy's standard[2] becomes, using 4.1 calories for each gram of protein, "for a man in full vigor at moderate work, food as eaten, protein sufficient to furnish 430.5 calories, and fats and carbo-hydrates sufficient to make a total of 3500 calories.'

This is one calorie from protein to eight total calories; that is, 3500 calories of food must be eaten daily and one-eighth of these should be furnished by protein.

Now, suppose we agree to make dinner contain half of the day's ration, and breakfast and luncheon each a quarter. (This special proportion need not necessarily be chosen, as any preferred arrangement may be made). Suppose lunch for a person has consisted of one glass of milk, one boiled egg, two slices of bread, butter, and one banana. Is this food in correct proportion, and is it enough? If so, according to our standard it should furnish 107.6 calories from protein and a total of 875 calories.

Using Fisher's table[3] we find the following:

	CALORIES FROM PROTEIN.	TOTAL CALORIES.
Small glass milk	19	100
One large egg	32	100
Two slices bread	26	200
Butter	0.5	100
One large banana	54	100
Total	82.5	600

We have here only 600 total calories as against the 875 needed, so evidently this is not enough for the man under the given conditions. Dividing 600 by 82.5 we have the ratio of calories from protein to total calories of 1:7.3. Since 1:8 was our standard, this lunch is evidently not rightly proportioned, being high in protein.

As much adaptation of the standard to varying conditions may be made as is desired by the teacher. If the "average man" weighs 154 pounds and the average girl in the class 100 pounds the necessary

[2] U. S. Department Agriculture, Year Book, 1907, p. 370.
[3] J. Amer. Med. Assn., 48 (1907), No. 16, pp. 1316–25.

modification of the standard is reasonably easy to find. For our lunch it would be 154:100 = 107.6:x (practically 70 calories from protein), and 154:100 = 875:x (568 calories). The calculated lunch then would have been adequate as to energy for the person weighing only 100 pounds, but too high in protein.

In order to make the work practical much weighing of 100-calorie portions must be done, but the exhibit of the amounts of food having equal fuel value catches the eye and is easy to remember. The piled-up plate of pickles contrasted with the lump and a half of sugar; the small glass of milk and the one shredded wheat biscuit; the one small chop, the slice of bread, or the one large potato, take on new meaning as to the part they play as equivalents in total calories in nutrition. But the servings mentioned in the table as "ordinary," "small," or "large" must be weighed out in detail, for people differ greatly as to the amount of an "ordinary" serving. If each member of the class cuts what she thinks is an ordinarily thick slice of bread, the slices will differ surprisingly. Dr. Fisher gives the weight of such a slice as 38 grams, the Battle Creek dietary list puts it at 28 grams, and what my class finally agreed upon as an ordinary slice of baker's bread weighed only 20 grams.

Even aside from this work, the ease of comparison of food values makes the 100-calories portion method quite worth while. For example, one day I was asked in class if it were true that dried fruits were a cheaper source of protein than meat. I turned to Fisher's table and suggested that we compare pork chops and dates.

The 100-calorie portion of dates is 1 oz., contains 2 calories from protein, and at 10 cents a pound, costs 6 mills. The 10 cents worth of dates would furnish 32 calories from protein, each of which would cost approximately 3 mills. If the chops were 28 cents a pound, and there were four in the pound, each chop, representing 4 100-calorie portions would cost 7 cents. Seventy-two of the 400 calories would be from protein, or one mill for one calorie from protein. So, although the 100-calorie portion of meat is nearly three times as expensive as the dates, as a source of protein the meat is very much the cheaper.

Shredded wheat biscuit, sometimes ranked as an expensive form of cereal food, costs about 9 mills a biscuit or a 100-calorie portion, and the protein furnishes 13 calories, or 1 calorie from protein for 0.7 mills, and is a somewhat cheaper source of protein than either the dates or the meat, although more expensive considered solely as a source of total energy than the dates.

All that is necessary to make these calculations is the market price per pound and Fisher's table.

Finally, it is very simple by the calorie method to arrange a meal that will conform with the standard, and the actual cooking and serving of such a meal with a carefully kept record of cost, trains the eye in recognizing relative food values in relation to money cost.

RELATION OF BIOLOGICAL CHEMISTRY TO HOME ECONOMICS.

WILLIAM J. GIES.[1]

Biological chemistry, considered from the standpoint of its greatest usefulness, is primarily chemical biology. Its foundations are physics, chemistry and biology. Biological chemistry, as a science, is chemical knowledge of biological substances and processes, *i.e.*, substances that commonly enter, or that are produced in, or are derived from, organisms; and processes that ordinarily affect, or that occur in, or are modified by, organisms. Biological chemistry, as an art, is fundamentally chemical in method and primarily biological in purpose. The biological chemist seeks to determine the nature of biological phenomena by chemical means; he does not attempt to establish purely chemical laws through biological agencies.

Among the leading subdivisions of biological chemistry are physiological chemistry, pathological chemistry, pharmacology, agricultural chemistry, botanical chemistry, and bacteriological chemistry. Physiological chemistry is the chemical branch of physiology, *i.e.*, the chemistry of substances and processes pertaining to healthy organisms. Physiological chemistry is physical chemistry, inorganic chemistry and organic chemistry applied to physiology.

The substances that engage the attention of the physiological chemist are very numerous in kind. They range in diversity of molecular character from the very simplest inorganic salts, *e.g.*, sodium chloride, to the most complex organic compounds, *e.g.*, nucleoprotein. The processes that form a large portion of the subject-matter of physiological chemistry are not only numerous in kind and varied in character, but often are also unique; and many are wholly inexplicable on the basis of our present knowledge.

Normal organisms are specially constituted to achieve two fundamental biological results, viz., their self-preservation and repro-

[1] Presented at the Boston Meeting of the American Home Economics Association, December 31, 1909.

duction. In effecting its own nutrition, an organism directly adds to its mass and enlarges its structure, as in growth; or it mainly "repairs" its parts, directly or indirectly from nutrient material, as in maturity. Nutrient materials (as a group) also supply energy, in one form or another, which is available for transformations to the advantage of the organism. Normal reproduction is, in effect, the nutrition of immature organisms derived directly from mature ones.

These two major functions of normal organisms (self-preservation and reproduction) are, in effect, the development, repair and reproduction of structure, as well as the maintenance of continuity in coördinated chemical processes. The mechanico-chemical functions of an organism (external respiration, heart-beat, excretion, etc.) are contributory to the highest efficiency of the major functions just mentioned, and, therefore, are essentially nutritional in ultimate significance. The chemical nature (composition) of an organism, as well as the peculiarities and functions of its tissues, are best understood when studied with due regard for the relations of all the parts and constituents to the nutritional processes.

Normal nutrition, whether in growth, in maturity, or in old age, is primarily chemical in method and constitutes the chief subject-matter of physiological chemistry. Pathological chemistry comprises the facts pertaining to nutrition in disease. The hygiene of nutrition is obviously a matter of fundamental personal and domestic importance.

With these ideas on the general nature and practical import of biological chemistry before us, I believe I can best perform the function allotted to me by presenting a general outline of the principal course in elementary physiological chemistry which we have been giving for about six years at the Columbia Medical School, which we have lately introduced at the N. Y. Teacher's College, and which, I feel, is particularly well adapted for the instruction of all whose interests include an understanding of the principles of general nutrition and dietetics, or any other chemical phase of biology.

In the course to which I allude, we place at the foundation of our experiments and discussions, the chemistry of typical cells as the units of living structure and the essential factors in biological dynamics. Every organism consists primarily of one or more cells. The higher organisms consist not only of cells but contain also much important material that is produced by and in their cells, but which is extracellular in location. Life is so intimately associated with intracellular

chemical transformations of energy that it seems to be dependent on, and apparently is an expression of, such intracellular changes. Many of the extracellular changes in organisms are of minor importance in the maintenance of life.

Chemical transformations of energy always involve chemical alterations of substances, *i.e.*, the production of one group of substances from another. Cells consist of mixtures of complex substances, which collectively, during the life of the cells containing them, continuously undergo life-maintaining chemical and physical alterations. Such changes involve the consumption of useful and, to some extent, of necessary intracellular substances, with an attendant production of certain simpler compounds ("waste products") that are of no use to the cells (catabolism). Accumulation of waste products in a cell interferes there mechanically and chemically with further beneficial transformations. Waste products are promptly ejected from normal cells.

Cells cannot retain their structural integrity, and are also unable to maintain their dynamic capacity, unless the life-giving intracellular processes of consumption and excretion (catabolism) are accompanied or followed by compensatory intracellular processes of repair, or direct replacement, or both (anabolism). This general conception furnishes the key to the whole subject of physiological chemistry. It carries us to the foundation of chemical biology. It emphasizes the cardinal fact that the utilization, removal and replacement of materials by an organism are expressions of its collective cellular requirements and peculiarities.

In this introductory phase of the course to which I am alluding, the composition and constituents of typical cellular masses (protoplasm) are studied; the leading cellular constituents are isolated and their structural as well as their dynamic relationships are indicated, so far as that is possible. This portion of the course is also intended to establish general principles regarding the origin and chemical nature of cellular constituents, the functions of cellular compounds, and the processes that characterize cellular activity and power. Both botanical and zoölogical materials are studied experimentally in these connections.

We then raise the question: How do animal cells obtain the materials required for their "repairs" and for the replacement of the substances consumed and removed in the life-giving transformations, *i.e.*, how are the cells nourished? The answer is found, in part, in

an intimate study of the physical and chemical properties of lymph and blood, which are the essential and active intermediaries in the exchange of materials in the animal organism (metabolism). "The circulatory system is the commissariat of the physiological army." The mechanico-chemical processes, by which cells obtain (assimilate) and blood and lymph yield nutrient materials, are considered both from theoretical and practical standpoints. The mechanical and chemical relationships between the cells and the blood, lymph, and "tissue juices" in general, are emphasized. We show that in the exercise of their local absorptive, digestive, transformative and constructive processes, the tissue cells obtain from blood and lymph the materials that are utilized directly or indirectly for the maintenance of cellular structure and the continuance of cellular activities.

Having established the direct nutritional dependence of animal cells upon constituents of the blood and lymph, we lead the student into a study of the substances and processes involved in the renewal of such constituents of blood and lymph as are utilized (assimilated) by the cells. This inquiry is, in effect: How is the supply of nutrients for the cells maintained in the blood and lymph? The chief subjects for consideration in this connection are internal and external respiration, and alimentation and absorption. The oxidative processes and gaseous exchanges involved in respiration are followed in detail. Under the general head of alimentation we study the composition, digestibility and general nutritive values of typical foods. The various digestive processes are fully treated, the influences of bacteria in the alimentary tract are considered, and the composition of feces, as well as the significance of its chief constituents, is noted. The channels of absorption are followed, and the qualities of the absorbable digestive products, as well as the transformations such products undergo, prior to and after their incorporation into the blood, are given due emphasis.

In the study of alimentation and absorption it is shown, for example, that food, which ordinarily consists for the most part of heterogeneous masses containing many complex substances, is chemically converted into fairly homogeneous liquid mixtures containing comparatively few, and relatively simple, nutrient products. The student learns that chief among the digestive products are monosaccharids, mainly glucose (representing primarily the food starches), glycerin and fatty acids or corresponding soaps (representing chiefly the food fats), and amino-acids (representing the food proteins). The student is also

taught, as clearly as possible in this connection, that the digestive and absorptive processes are analogous, in their results, to the achievements of stone cutters and masons. Stone cutters convert rock masses of various shapes and dimensions into massive construction units, of a few types and sizes, which masons put into harmonious relationships in the erection, repair, or extension of buildings on definite plans. The digestive processes convert organic food substances, of many different types and molecular configurations, into molecular construction units of a few kinds and sizes, which, in most cases, are specially adapted for immediate conversion into compounds characteristic of normal blood and lymph. Various groups of cells along the absorptive channels actively rearrange many of these organic molecular construction units into normal blood and lymph constituents of the more complex types.

The opposite phase of cellular nutrition is next brought forward. How are waste products eliminated from the cells? What are the local and systemic influences and general fate of the various kinds of waste products? The gaseous eliminations having been considered in the prior study of respiration, and the gastro-intestinal excretions having been discussed in connection with the previous observations on feces, further attention (though for the time being only in a general way), is now given to local and general excretion, especially from the skin and kidneys.

This sequence in the consideration of subjects enables us to proceed easily and logically from a study of the typical individual cell, of cells in general, and of the body as a whole, to examinations of specific parts of the organism, *i.e.*, of the groups of specialized cells, the respective tissues and organs. Such examinations develop the esssential facts regarding tissue structure and composition, as well as the local and general functional relationships of the peculiar tissue constituents. The relative chemical activities and the corresponding nutritive demands of the tissues as specialized parts are duly emphasized, and the way is prepared for final and more detailed considerations of general metabolism, the nature and metabolic significance of the various urinary constituents, and food requirements and selection.

The laboratory work of this course (6 hours per week for a half year) is extended into every important phase of the general subject. The formal lectures (two weekly), besides correlating the results of the experiments and demonstrations with the essential principles, are devoted to various general themes that cannot be given objective

treatment in the time allotted for the course, such as chemical coördinations in the body, the chemical processes in embryonic development and lactation, chemical defenses of the organism against disease, biochemical effects of medicines and other foreign agents, typical biochemical perversions associated with disease, etc. The course is designed to establish fundamental biochemical principles, and to develop capacity and confidence in the interpretation of biochemical phenomena.

The prerequisites of such a course as I have just outlined are physics, general chemistry, organic chemistry, and physiology or general biology. It is impossible to understand the scientific and practical aspects of general nutrition and dietetics without the knowledge afforded by such a course in physiological chemistry.

If my remarks have led you to the conclusion that, in the course I have outlined, every problem is viewed from its relation to the central fact that the cells are the units of structure and the centers or agents of biological power and activity, one of my main expectations has been realized. It is customary in many quarters, in the study and exposition of the data of normal metabolism, to deal largely in nutritional and dietetic generalities—to consider the body as a whole, but to disregard the chemical peculiarities of its parts and to ignore the eccentricities of local (tissue) chemical behavior. Nutrition and dietetics should be studied and taught, in connection with related subjects pertaining to Home Economics, for the purpose of establishing healthy dietary customs, and thereby preventing malnutrition and consequent disease; and also in order to provide information leading to the relief, and if possible to the cure, of metabolic disorders by adequate nutritional readjustments. Such study and instruction should be based on the fullest knowledge of the peculiarities of cell chemistry in general and of tissue chemistry in particular, both in health and disease.

I am sure you will agree with me when I say that investigations of the kinds and quantities of food supplies shipped into Boston, and inquiries regarding the general selection and preparation of such materials, the main channels of their distribution and the methods of their transportation to the various parts of the city, together with determinations of the nature and peculiarities of Boston's sewage and sewage system, would fail to afford correct or adequate conceptions of Boston's dietary characteristics or requirements. We should have to learn much, besides, about the people of Boston in order to

understand and appreciate their collective dietary needs. We might ascertain many general facts pertaining to the city and its inhabitants, in times of peace as well as in periods of disorder, and yet, if we learned little or nothing about the people of Boston as individuals, if we ignored their individual characteristics and activities and needs, as well as the occupations, customs and other peculiarities of the various groups of citizens, our deductions regarding the kinds and amount of food needed daily in Boston would be decidedly imperfect, and our conclusions on ways and means for maintaining the nutritional welfare of all the people in Boston would be largely guesswork.

So it may be with certain courses in nutrition and dietetics. Our study and teaching of these important matters should not be confined to the accumulation and interpretation of general statistics, but should include due attention to the dynamic factors in metabolism—the individual cells and the tissues, under both normal and pathological conditions.

Such an elementary course as the one I have outlined, if based on adequate preliminary training in physics, chemistry and biology, offers much to be desired in this connection. I am glad to add, in conclusion, that my experience at Columbia with courses of this kind has given cumulative emphasis to these opinions and convictions.

DISCUSSION

MISS KINNE: I should like to ask Dr. Gies where he would place his course in such a scheme as Dr. Stiles has presented.[1]

DR. GIES: It seems to me that, in Dr. Stiles' arrangement of courses—which is a very good one—physiological chemistry should occupy a place beside anatomy and mechanical physiology, or should follow anatomy and mechanical physiology. Naturally all arrangements of courses are matters of practical adjustment, and it is a rare thing that any one course can be fitted ideally into a system of courses. I feel that the leading chemical applications to physiology should be emphasized in connection with studies of anatomy and mechanical physiology. My statement that physiological chemistry is chemistry applied to physiology might be put in another way—that physiological chemistry is chiefly *chemical physiology*. I think that, along with anatomy and physiology, chemico-physiological facts

[1] J. Home Econ. 2 (1910), No. 2, p. 393.

and principles should be given due consideration—and in a separate laboratory course whenever that can be done.

MISS MARLATT: I am concerned with the question as to how much of this biological chemistry can be given to students who have not had work in organic chemistry. I should like to ask Dr. Gies' opinion on that matter.

DR. GIES: Such a condition offers a very serious predicament. It certainly is true that you cannot satisfactorily teach biological chemistry to students who do not have adequate knowledge of elementary organic chemistry to begin with. If you endeavor to teach the elements of organic chemistry and the applications of chemistry to biology in the same course, you find it impossible to do justice to the latter subject, and you confuse and disappoint the average student besides. I hope the deliberations of this association will bring about increased requirements and greater opportunities in physics, chemistry and biology at the beginning of the training of women in higher education. You need these three tools in your biological work in household arts and sciences; and they should be as effective in your hands as we try to make them for the students and practitioners of medicine.

COURSES IN BACTERIOLOGY FOR HOME ECONOMICS.

H. W. Conn.

Professor of Biology, Wesleyan University.

Botanically speaking, bacteria form only a small family of minute plants. In most botanical text books they have until recently not been described at all, and even to-day only a page or two is given to them. But though botanically they are of little importance, practically they have been found to have a most profound influence upon the life and welfare of the home, and consciously or unconsciously every housewife has to deal with them. From morning till night she is constantly contending with them or using them as allies. The importance of the functions performed by these organisms has already forced their study into our medical schools and they are rapidly demanding more and more attention from the students of agriculture. No less closely are they related to Home Economics, and no less surely is bacteriology forcing itself into courses of domestic science.

In considering the ground that should be covered by such a course it is a logical necessity to include with *bacteria* the study of the closely allied *yeasts* and the less closely allied *molds*. For while in popular estimation yeasts and molds have a very different kind of reputation from bacteria, in reality they are so very similar, in function at least, that it is quite impossible to separate them. Not only are they microscopically much alike, but they are all studied by similar methods and are all associated with similar functions. The study of bacteria in Home Economics must therefore inevitably include the yeasts and molds. The general term *microbiology* would be a much better title to this class of studies than the more widely used term *bacteriology*.

The course covering this subject in Home Economics should include two different phases which, however, ought to be combined into one consistent whole. The first should be a theoretical course with a text book, accompanied by lectures and illustrations. Unlike many branches of science bacteriology cannot well be taught by the laboratory method, especially with large classes. Microscopes are too expensive, laboratory equipment too rarely at hand, and experimental

work is too time-consuming to make it possible to cover much ground in the laboratory. For general information, therefore, reliance must be placed upon class-room work with lectures and demonstrations.

But the fundamental facts of the nature, distribution and multiplication of microörganisms can only be appreciated by the use of the laboratory method, and the second part of the course should include some practical laboratory work. This should accompany the theoretical work, though it cannot follow in parallel lines owing to the length of time required for making culture media and in waiting for cultures to grow. For simple laboratory work no great amount of apparatus is needed. A microscope to show the actual appearance of bacteria is desirable but not absolutely necessary, since most of the experiments will handle bacteria in masses and not individually. The equipment of a school kitchen, with some glassware borrowed from a chemical laboratory and a few Petri dishes and fermentation tubes will serve as apparatus sufficient for an extended series of useful experiments.

THEORETICAL COURSE.

The practical value of bacteriology to domestic science is indicated by the simple enumeration of the topics which it should include.

Non-pathogenic microörganisms:

Useful—Microörganisms are not used in the home for a very great variety of purposes. This subject covers, however, the function of yeast in fermentation, including the raising of bread and the preparation of fermented beverages. Molds are only incidentally useful, though they are the cause of some of the delicious cheese flavors (Roquefort, Stilton, Camembert). Bacteria are of little value in the home, but they are at least the cause of the souring of milk and they are the agents which produce vinegar, sour kraut and some other soured foods.

Detrimental—The undesired activities of bacteria are endless, but they are all associated with their agency in producing decomposition. Like all colorless plants they are concerned in the chemical destruction of organic foods. *Yeasts* cause the breaking down of sugar and spoil our sugar-holding foods like jellies, sweetened condensed milk, maple sugar, etc. *Molds* attack various substances which are damp but not wet and cause the decay of fruit, the mustiness of cheese or flour, the mildew of cloth or leather, and sometimes the decay of wood. *Bacteria* are not fond of sugars but will attack

almost any kind of wet food. They cause putrefaction and decay. They sour or otherwise spoil milk and render it impossible to keep it long; and indeed they prevent the keeping of any kind of moist food. They are the cause of most of the bad odors around the pantry and the ice chest and they are actively at work in the garbage pail and in all masses of kitchen refuse. In sink drains, in closets and traps, and even in foods which are stored for a few hours only, they are busily at work. That all these phenomena, together with methods of preventing them, should form a part of the study of Home Economics is too evident to require emphasis.

Pathogenic Organisms:

The relation of microörganisms to disease is to-day everywhere recognized; their relation to contagion is less fully understood. The treatment of disease belongs to the physician, but the checking of contagion is primarily a part of Home Economics. It is to-day appreciated that the nurse plays a part in the handling of disease not second to the physician, but it is not sufficiently realized that the confining of diseases to the sick room and the protection of the rest of the family belong emphatically to the home-keeper. Clearly no one is fitted to be the head of a properly kept household in these days who does not understand the relation of contagion to living germs, the general nature and conditions of life of bacteria, their method of discharge from a patient, their means of distribution from the sick to the well, their channels of entrance into the individual, and the methods of destroying them or preventing their distribution. The meaning of bacteriological cleanliness, the cleansing of wounds and methods of disinfection and sterilization should be a part of every housewife's educational equipment. The amount of sickness, suffering and death that is directly attributable to a lack of such information is simply incalculable, and knowledge of bacteria and their habits has thus become one of the integral requirements for properly conducting the home.

PRACTICAL COURSE.

The kind and number of laboratory experiments and class demonstrations that accompany the theoretical work must vary with the conditions of the laboratory and the time available for such work. Even without a miscroscope much can be shown by cultures and

handling bacteria in masses that will greatly illumine the class work. Suggestions for many simple experiments and class demonstrations may be found in books easily obtainable. They should include the preparation of simple culture media and easy experiments in making bacteria cultures. Culture plates exposed to the air of a room before and after occupancy by a class, or before and after sweeping, teach a lesson concerning the distribution of bacteria and molds more forcibly than any class work can do. Tests as to the keeping of milk at cool and warm temperatures, with and without sterilization or pasteurization, are easily planned and carried out, and materially add to and emphazise the study of milk bacteria. Tests upon the efficiency of drying as a method of preventing bacteria or mold growth and upon the value of disinfectants are easy to devise. The bad influence of a piece of decaying fruit when in contact with whole fruit is easily shown and the functions of yeast in bread-making with the relations of these phenomena to temperature may be readily demonstrated by fermentation tubes. A student who has actually seen growing upon culture plates colonies from bacteria which have dropped into it from the air will retain a vivid and lasting lesson that no text book can impart. The greater the number of such ocular demonstrations the more thoroughly will the subject become a part of the equipment of the student until she will learn unconsciously to adopt right methods.

The time required to cover such a course will inevitably be in a measure determined by that demanded by other subjects. It should not cover less than a term's work and could be profitably extended to double this amount. There will always be a temptation to neglect such work in favor of the more attractive phases of Home Economics, and for this very reason more emphasis should be placed upon the subject.

THE IMPROVEMENT OF PUBLIC HEALTH THROUGH THE TEACHING OF HYGIENE IN THE ELEMENTARY SCHOOLS.[1]

FRANCES STERN.

The scientific laboratory has been studying conditions and causes of disease, and new ways and means must be devised to apply this knowledge for the creation of right living conditions. Perhaps all that can be done for the adult is to give him the means of knowledge—point the way how to use it, and let him accept it if he will—but for the children, parents and citizens of the future, there is a deeper responsibility. The state has taken it upon herself to educate these children.

It certainly seems reasonable that as much attention should be given to the building up of a healthy body as to the development of the mind. During the early years of school life the growth of the child should be given the foremost consideration.

The body has withstood the ravages of civilization so wonderfully that not until aroused by the leaders in the campaign against tuberculosis or those investigating the health of the school children have we realized the number who are suffering from physical ills, due to lack of wholesome food, fresh air, or proper clothing, and shelter.

Attempts to teach the simple principles of hygiene have been difficult, owing to lack of provision for such teaching in the public school. The school house and school room should themselves be examples of cleanness and afford every means to help the child to live under the conditions that make for right living. As has been said, "a most essential part of modern education is the early formation of such habits with regard to environment as shall conduce to the best living," but it seems almost useless to teach the lessons of hygiene and sanitation when the child has but to look about and see the laws violated, or to ask him to clean his hands if he is denied hot

[1] Read at the Boston Meeting of the Education Section of the American Home Economics Association, July 5, 1910.

water. At least the school-room dust can be cared for with a dustless duster, if a vacuum cleaner is out of the question. After a scientific lesson with Petri plates, the children will be interested to keep the room free from dust as far as possible.

Treating the subject of hygiene through such interest, it can readily be made an integral factor in the following group of topics: The care of the home, the furnishing of the home, food and its care and preparation, personal hygiene, and the hygiene of clothing. The essentials common to the above topics that make for the health and well-being of the child, are cleanness, pure air and sunlight, exercise and rest, and the beauty of environment.

The child has little direct influence on these, for the adult chooses the home, limited in choice, perhaps, by a meagre income and the type of building found in the large cities. But in the early period of life the child does not apprehend his environment. His imagination, stimulated and fostered in play, seems to create experiences that are as delightful as they are real. The doll of wood is hugged as closely as the most expensively dressed French doll, the gold house set with diamonds to be won in "London Bridge" is in imagination not far away. Subways may be dug in sand, and temples erected with sticks and stones. Cannot educators striving to improve the health of the child make use of this play, and translate it into a directive force for the child's good through this means?

The scheme must be clear in the teacher's mind—she must study the child, and adapt the work to the child's growing need. And, further, she must be so familiar with the scientific facts that their application is, like art, concealed. In the building of a house, for example, the first lesson in ventilation is that there must be an outlet for the foul air at the top of the room. This thought can be developed beginning with the child in the kindergarten, in the construction of the house of blocks or the paper cutting; it can be shown in the representation of a room, pictured on paper, the fitting and furnishings cut from magazines and catalogues; it can be written about in the hygiene lessons, illustrated by cuttings and drawings; it can be considered in the plan for the wooden or card-board house. If the lesson is kept alive in the child's mind, and emphasized at the different stages of development, and through different forms of work, when he has the chance to control the windows in his own home they will be kept open.

The children at the Louisa Alcott Club had been constructing a

paste-board house made from a hat-box. The principle of ventilation had been discussed, and the writer wished to illustrate it by means of the little house, but since it was so likely to take fire, a wooden box, representing a section of a room, was used. This box measured 12 by 12 by 6 inches and had six holes, two on each side, one a little below the top and one near the bottom, and two at the top one inch and a half in diameter, closed with corks to be taken out at will.

First the children breathed into tubes containing lime water (colored red with phenolphthalein) and the liquid turned white. Then the carbon dioxid from a burning candle was collected in a tube, and produced a similar coloration of the solution. To show more clearly that this was the result of combustion, sugar was burned and the carbon dioxid collected and subjected to the same test. The children could easily see that the gases were alike in this one respect. The pretty red solution and the magic change to white pleased them.

Candles were then placed on a diagonal in the box and lighted, with the result that the carbon dioxid rising with the heated air caused the upper candles to go out. Some of this air was drawn through the same red liquid, and thereby the children learned that the candles were giving off the same material as had been secured in the tubes, and that this affected the candles at the top of the room. The children tested the air currents by means of joss-sticks, to see which way the wind blew. The upper holes, those in the roof, were then opened. Immediately all the candles brightened, and the children saw that fresh air was entering as the warm air and carbon dioxid passed off.

Various other experiments were tried, such as supplying air from above, below and with cross currents; sometimes breathing into it and then drawing out the air, and testing with the lime water; or again, drawing out the air in which the candles had been burning. It was unanimously decided always to have the windows open from the top, and to try not to sleep in a room where candles or lamps were burning.

Such a lesson need not take much extra time, for it may be made a lesson in hygiene, drawing, and arithmetic, extending over several periods, and along with this, the written work will be most effective. The lesson in English, so necessary to the children, can be taught through the subjects close to their lives, and since it tells of the great wonders of the universe, it can be made uplifting. Compositions about household activities can be illustrated by cuttings

from magazines and catalogues, and even so ugly a subject as garbage has been made interesting. The bedroom, with its pretty furnishings, and the early morning light awakening the inmates, has made a very charming story.

This winter the story about tuberculosis was written, without any phthisisiphobia, because it was based upon the laws of nature and sanitation. Through a talk about the plants and flowers, tracing cause and effect, they saw that all life comes under the same laws and that the laws of sanitation or hygiene could prevent as well as cure. The scientific presentation made it impersonal, though its application was concrete.

The public school curriculum is still so crowded in the desire to develop the child in every direction that it cannot lay sufficient stress on education for health, and the majority of homes cannot, or do not, provide these elements of instruction which every child should receive. The result is that a large proportion of the children in the schools are physically unfit. For these children a new type of school is essential. The open-air school meets this need, by giving careful attention to every detail of nutrition and sanitation. The child lives in the open air and is taught to know its value, so that in time his system rebels at close quarters. He has simple, good, wholesome food, and gradually desires it above all other. He learns to delight in a cold sponge bath that invigorates, and in warm water and soap that clean the hands and body.

The daily routine in the school begins to affect his life so that these lessons are carried into the home. Sometimes the conditions are difficult to overcome, and sometimes the family at home does not quite understand, and so, as extension work, a "visitor-teacher" should be sent to help the home fulfill the instruction given at school.

This survey emphasizes two important points: First, that in education health is fundamental and that the school should train the child in habits of health; and, second, that to accomplish this end, conditions in the school room must be wholesome. The child should be given a comfortable chair and desk suited to his size. The school room should be well lighted, the air in the room fresh and free from germ-bearing dust. There should be time for play out of doors, and time and facilities for bathing.

It is possible for the teacher to correlate the studies and to give instruction in practical hygiene, inculcating habits of cleanness and an enthusiasm for health which will give her pupils the chance in after life to be healthy, happy, efficient beings.

TEACHING BACTERIOLOGY TO MOTHERS.

H. W. Hill, M.D.

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The Problem.—Until such time as poverty is abolished, or the State takes charge of children, the majority of the women of the race must continue to rear the majority of the children of the race inadequately, in homes too small, without facilities, doing for them somehow, individually and alone, that which three women could hardly do well, working together.

This is not a slum problem nor a problem of the rich. Numerically the race is chiefly middle class, neither rich nor extremely poor, judged by ordinary standards. This is the problem of the family with an income below $3000, *i.e.*, it is the problem of the race proper, and it is the old problem of the pre-mosaic Hebrew—how to make bricks w thout straw,—alas, without knowing how to make bricks at all.

The problem as a whole involves food, clothing, proper physical development, morals, edcuation, amusement, discipline, and citizenship. But the public hygienist has *as yet* but indirect concern with these. The public hygienist—the "board of health man"—*as yet* concerns himself chiefly and by general expectation and consent, with the grosser, more imminent, more spectacular, more immediately tragic problems of disease and death, and chiefly with only one group of these, the infectious diseases. However much in ordinary life, over-crowding, lack of facilities and over-burdening of the mother may render unavailing even the tears and ageing, the back-ache, heart-ache, crooked fingers and wrinkled face of the mother striving for her young, ten times over is the effect of these seen when disease enters the family, adding its burdens, its sorrows, its disabilities and its deaths.

Once more, remember this is not in the slums alone, nor, numerically, chiefly there. It is found in city and country, village and town, everywhere, the overburdening of mothers, in ordinary life, added to ten times over when disease springs up.

How Big A Problem is It?—Call the population of the United States 80,000,000. Remember that sooner or later, every member of each generation suffers from at least one infectious disease, often from two, three or four, and it is clear that every generation suffers anywhere from 80,000,000 to 240,000,000 attacks of infections. Each generation pays out at least eight billions of dollars for this running of the gauntlet, not to speak of the disability and death of those who run it unsuccessfully. Tuberculosis, diphtheria, summer diarrhea, scarlet fever, measles, typhoid fever, whooping cough, chickenpox, to name only some of those best known to the laity, how much sorrow, distress, poverty, how much "making of none avail" of mothers' hopes and prayers and wearing effort have these caused! Yet so common are they that "childrens' diseases" are looked upon as a necessary stage, almost a joke. Indeed some people deliberately expose their children to them, "to have it over with!" Yet who bears the burden, the sleepless nights, the extra work, the nervous strain, the hope deferred?

Ninety-five per cent of the infectious diseases are nursed at home by mothers. Next to the children themselves the one who suffers most is the mother.

Who Keeps the Infectious Disease Going?—Once more the answer is —and most emphatically—the mother, woman in general, but chiefly after all the mother. To be sure there is every excuse for the mother, —overwork, overcrowding, lack of facilities, above all ignorance and misdirected training, "mis-information piled on lack of any," but with all the perfectly good apologies stated and all the excellent goodwill and effort counted in, the fact itself remains, that mothers propagate and keep alive and spread the infectious diseases of children more than any other one body of people, and that until they learn the rules of the game and follow them, no amount of coaching or effort from the sidelines will help.

Why and How are Women Responsible?—Because mothers are doing the work—women in general, but chiefly mothers. The farmer is responsible (apart from flood, drought, storm or other "acts of God") for whatever happens to the crop from seed to market. Women in general—but chiefly mothers—are the "raisers" and "crop-handlers" of the largest, most valuable, most expensive and most difficult crop in the country. What happens to this crop between birth and sixteen years of age is, chiefly, what women do to it, or at least do not prevent. For the first 5000 days of the years of the life of

each generation, the race is fed, dressed, undressed, washed, combed, cuddled, kissed, praised, blamed, led, driven, coaxed, taught, spanked, bossed and otherwise "brought up" by women—women mothers at home, women teachers at school. It is during this time of tutelage and supervision by women that children receive their infections; it is during this time that the race runs its gauntlet, dances its little dance with death—and pays eight billions for it.

What is the Specific Fault of Mothers?—Let it be understood that the specific fault is of the head, not the heart. It is due to bad teaching and misdirected energy. It is almost impossible to avoid it under existing circumstances, and it is extremely disgusting to talk about. However, as to the last point it may be said as Dr. MacCormick has it—it is much more disgusting to do.

The specific thing at fault in the spread of infectious diseases is the exchange of discharges. We know now that practically speaking all the infectious diseases are infectious because they are caused by bacteria or similarly minute forms of living things. It is the transfer of these germs from sick to well persons which spreads the disease, The sick child, whether it has tuberculosis, typhoid, diphtheria, scarlet fever, mumps, measles, or whooping cough, has its discharges full of germs of the disease concerned. In typhoid fever, the germs are chiefly in the discharges from the bowels and bladder, in the other diseases chiefly in the discharges from the mouth or nose. But however these germs leave the sick person, they, practically speaking, never produce another case of the disease unless a well person gets these discharges into his or her mouth Disgusting? Yes,—but *true*. If a child never takes the discharges of a sick person into his mouth he will never contract an infectious disease.

As a matter of fact the exchange of normal discharges goes on all of the time. Think of it. The mother kisses her baby, or tries the nipple of the nursing bottle to see if it draws well, or if the milk is warm enough, by first sucking the nipple herself, and of course her mouth discharges go into the baby's mouth. She feeds the baby with a spoon, and tries the temperature of the spoon and its contents in her own mouth first or she laughs and talks into the baby's face, cuddling and playing with it The fine spray from her mouth, thrown out in the explosive outrush of air during speech, as it is not during quiet breathing, flies over the baby's face, into its mouth, eyes, nose, and the baby's into hers. But so long as the discharges of each are normal no great harm results. But, if either

mother or child have tuberculosis or diphtheria, etc., both are pretty sure to become infected.

So, more remotely, there are possibilities of infection from the mother as she talks or sings as she lays the table or prepares the food, thus spraying her mouth contents into and upon everything in front of her—and her children put these things into their mouths. Still this is, although the most inevitable, the least of the ways of transmission of infections.

The chief spread of infections is on the hands—tuberculosis, diphtheria, scarlet fever, the whole list. It is human nature to put the fingers into the mouth. It is mother nature to put her fingers into her children's mouths, directly or indirectly through spoons, cups or food itself.

But the discharges of the mouth and nose are not alone those transmitted. Through hurried or inefficient washing of hands the mother even transfers bladder and bowel discharges from herself to her children's mouths, directly on her hands, and indirectly through food and eating utensils touched by her hands. She transfers the children's discharges from one child to the other also. The children do the same. They convey their own discharges on their hands, and indirectly by touching things such as food, gum, pencils, and whistles, that go into other children's mouths.

It is the serious belief and teaching of the best professional public hygienists that in these two ways—mouth-spray for mouth discharges, and hands for mouth, bladder and bowel discharges—the ordinary infectious diseases are chiefly transmitted. With rigid attention to these points trained nurses in certain Parisian hospitals successfully nurse in open wards diphtheria, scarlet fever, and measles together without any patient contracting another's disease. Very much more might be said to emphasize, illustrate and demonstrate the truth of these statements, but perhaps the fact that this is the basic principle of modern epidemiology will be sufficient proof.

Teaching Bacteriology to Mothers a Partial Solution.—From what has been said it must be clear that the ordinary interchange within the family of the discharges of the members of the family, and at school of the attendants at the school, is constant and inevitable while things remain as they are. Where is it possible to break into the conditions and so change them that this exchange shall cease?

We take desperate measures to prevent this exchange of discharges in the face of epidemics—isolation of the patient, quarantine of the

family, removal of the patient bodily to a hospital. These measures, especially the latter, keep the stream of discharges from the sick child away from the mouths of those outside the family, but only removal to a hospital will as a rule be effective in preventing continued or even more concentrated exchange within the family—for isolation within the family in the ordinary overcrowded house, with the ordinary overworked mother, knowing nothing of these things practically, rarely succeeds. The real difficulty lies deeper still in present conditions. It may be possible to prevent the discharges of the sick child, recognized as having a contagious disease, from entering other people's mouths. But the existence of the constant exchange of discharges in the family and at the school makes it almost inevitable that in the early stages of the disease and in many cases of disease too light to catch the attention of the mothers, the harm is done before, if ever, the case is recognized. Undoubtedly the early, unrecognized and alas! the concealed cases (concealed by the mother, it may be, to avoid quarantine or isolation), maintain the infectious diseases much more than the plainly recognized case. Hence, the only perfect safeguard is to do away with the exchange of normal discharges in health, as a matter of habit and principle, in order that when disease comes the pathways for its spread may not be beaten smooth, ready and waiting to carry it broadcast before its presence is recognized.

Women unfortunately are innately clean as regards visible dirt—probably as part of the feminine desire for adornment. But it is not visible dirt that hurts, it is invisible dirt. The clean shining morning face is not half so important as clean—really clean—hands, hands free of discharges. If the floor be free of discharges, those horrors of the housewife, dust and mud, do no real harm, or so little as to be practically negligible. The white collar and cuffs, the brushed hair, the fresh table linen and the polished spoons and forks mean nothing from a anitary standpoint, and if meanwhile the cook is putting discharges into the food, these refinements are worse than mere delusions, they are snares.

To teach women—girls—prospective mother —that they may practice in their households and teach in turn their children to war on invisible dirt is one of the functions of bacteriology. Bacteriology alone will point the way to real cleanl'ness. Only the starting demonstrations of its unescapable conclusions, ground into the people can secure results. Only in the public schools can it be taught with emphasis, weight and uniformity enough to impress the masses. Only

in the grades can it be counted upon to reach the masses. But 1 per cent. of the population ever reach the university, but 25 per cent. reach the high schools. The great mass of the mothers of the coming generation—of the American race—and the mothers of more than their average of children are receiving grade school education only. Need more be said?

Summary.—The infectious diseases in general radiate from and are kept going by women. Women must learn to break up, divert, stop in some manner—in every manner—the exchange of normal discharges amongst children at school and amidst families at home if infectious diseases are to be abolished or abated. The needful information, beliefs, technique and habits cannot be had or established except by studying the basic principles of bacteriology. Bacteriology must be taught in the grades of the public schools if it is to reach those who most need it.

Radical changes in Social Conditions the Real Solution. If (as cannot be) every girl now at grade school could be thoroughly taught all that a trained nurse knows—theory and practice—the best to be hoped is that, becoming a mother, ten to twenty years hence, she may remember enough to care for, if she have the facilities, the first case of infection in her household without permitting its spread to the other members or to outsiders. Alas, not one third of the girls would remember, not one-tenth will have the facilities. Above all what shall be done in that intervening ten to twenty years? Lectures, writings, sermons, appeals to mothers' clubs, university extensions, moving pictures —all the publicity that can be had or hoped for—will not teach technique to the mother now in possession of the present generation —although they all help—nor once more, if it taught them, would it provide the facilities needed. Economic conditions must change and change specifically to aid the mother if we are to gain at all. Also, the prevention of disease must engage the serious attention of governments—the *prevention* of disease, not the talking about it or the looking wise over it, or the making of fine addresses on it, but *preventing* it. The prevention must include a tremendous organization to prevent human discharges entering water supplies, milk supplies, food supplies; must involve watchfulness of hotels, restaurants, public institutions of all sorts—in short, of all public alimentary utilities, with all their off-shoots and side issues wherever found. And the whole must be coöperative. The government must strike at the sources, the woman at the means of spread, and the man must support both, for the sake of the women and children.

DOMESTIC SCIENCE IN HAWAII.

AGNES HUNT.

The various educational institutions in the Hawaiian Islands have a peculiar situation to meet owing to the diversity of nationalities and consequent diversity of languages. Among these nationalities, the Orientals, including Japanese, Chinese and Korean, take precedence as to numbers; the Hawaiians, Portuguese and Porto Ricans next, and the English, Americans, and Germans following. Just recently a large number of Russians and Filipinos have been brought to work on the various plantations. Owing to this conglomerate group of peoples, "pidgin English," the vernacular common and peculiar to the east, has come into use, influencing to a very great extent the purity of the English language.

The Chinese and Japanese maintain schools in which their own languages are taught and their traditions preserved. Many of these children attend the public schools regularly from nine in the morning until two in the afternoon five days a week, while they attend their own schools early in the morning from seven until nearly nine, then in the afternoon for two or three hours, Saturdays and Sundays only adding more time for the studyof their native languages and learning.

The different educational institutions here may be conveniently divided according as they derive the funds for their support as follows:

(1) *Those supported by the territory and the federal government.*—Under this group come the public schools, the normal school, and the College of Hawaii. The public schools are quite thorough and complete in their work. The teachers and supervisors are well trained men and women, the majority having received their education on the mainland. The high school work is of such grade that its graduates are received in most of the universities of the United States without any further preparation. It is to be noted, however, that the average age of pupils in the grades and high schools is relatively higher than in corresponding grades in the States. The normal school has an efficient force of teachers, many of them of college training, who graduate from the various departments teachers filling good positions on

the islands. Manual training and domestic science come in for their share of attention. The College of Hawaii is a new institution, of university rank, having its origin under the Morrill acts of 1862 and 1890, thereby corresponding to the land-grant or agricultural and mechanic arts colleges of the various states and territories. The first year of instruction commenced in 1908 with four courses, on completion of which degrees are granted in agriculture, engineering, science and Household Economics. Only those who have been graduated from a high school of acknowledged standing or its equivalent are admitted as regular students.

(2) *Privately endowed institutions.*—Among these are the Kamehameha schools, the Punahou School, better known as Oahu College, the free kindergartens, Kohala Seminary for girls, and the Hilo Boys' Boarding School, all on Hawaii, and the Maunaolu Girls' Seminary on Maui. The Kamehameha schools comprise two separate schools, one for boys and one for girls. Only pupils of Hawaiian parentage are eligible for entrance. Through the large endowment from the Bishop estate, the equipment is first class, the dormitories and campus spacious and well-kept and the faculty of a high grade. The institution especially emphasizes manual training and domestic science.

The Punahou School is an outgrowth of instruction given in the earlier days for the children of missionary families. The work given includes the grade work in the preparatory department and the high school work in Oahu College, fitting the graduate to enter the College of Hawaii or other collegiate institutions without examination. The instruction is unusually good, and the buildings and campus are imposing, while the athletic field adds no little to the attractiveness of the institution.

The free kindergartens are doing an effective service, nearly a thousand children taking advantage of them to gain some knowledge of English before entering the receiving and primary grades. Kohala Seminary, Maunaolu Seminary, and the Hilo Boys' Boarding School give instruction of lower standard than the high school work, but no less effective.

(3) *Institutions in part or entirely supported by religious organizations.*—These include the Mid-Pacific Institute (partly endowed), Iolani College, Aliiolani College, St. Louis College and several mission schools in various parts of the islands. The Mid-Pacific Institute comprises the Mills Institute for boys and the Kawaiahao Seminary for girls. Its scope is similar to the Kamehameha schools, except

that it is not restricted by creed or nationality. The term college as quite commonly applied in the islands is somewhat misleading, as can be seen in the cases just mentioned where the instruction hardly extends beyond the seventh or eighth grades.

The Palama Settlement, the St. Elizabeth's Mission in Honolulu, and the various missions over the islands indicate to a very limited extent the phenomenal philanthropic spirit manifested by generous people.

Thus it can be seen there is not a dearth of education facilities, but rather a scattering of forces that have evolved to the present status through changes in the government, the missionary activities, and interests aroused through philanthropic stimulus.

The idea of domestic science in the Hawaiian Islands is not new. Some of the institutions have applied domestic science as a system whereby the running expenses of the institution are reduced to a minimum. That is, the work is apportioned out to the girls, and under the supervision of trained assistants all the work from the laundry to preparing the meals and caring for the household is done by them. This system is carried out in the Kamehameha Girls' School, the Kawaiahao Seminary, the Kohala Seminary, and the Girls' Industrial School (reform school). Each girl thus learns how to perform all the duties of a household and to do them systematically. The advantage of this is plainly evident when one considers that only a few generations have passed since the homes of the native Hawaiians were grass huts, their china, wooden bowls, their food, fish from a nearby pond and "pot" from an adjacent taro patch.

It is very difficult to teach much more than the actual methods in these institutions, with a little of the "whys and wherefores." With sewing, the girls are much more apt than in the other work and seem to have a natural gift for it. Whether the love of personal adornment appeals more to them and they can see the immediate improvement more readily than in the other branches, I cannot say. They are very soon able to make for themselves simple gowns neatly and prettily. The courses in the schools just mentioned are systematic, starting in with the lower grades and working through until the drafting, cutting and fitting are very deftly done. Mrs. Agnes Burt of the Kawaiahao Seminary has just published two clever manuals in which the work done during the terms may be preserved intact for each girl. The first manual has printed instructions for the various stitches with methods, and opposite each a blank leaf for the sampler to be inserted.

The second manual has a similar arrangement for advanced combinations of stitches and drafting. A view of the main sewing room of this seminary is shown in the frontispiece of this number.

The department of domestic science of the normal school, under the supervision of Miss Lee, formerly of Teachers College, gives instruction in both cooking and sewing. Quite a novel scheme has been developed in order to maintain domestic science work in this school. The funds available have from the first been very limited and the work has been so arranged that the foods from the kitchen are sold for a very nominal fee to the pupils and teachers as a luncheon. This usually consists of a soup and a dessert, sandwiches and a dessert, or a soup and a salad. Quite a variety of dishes may be learned, but the pupil has little or no time to find out anything aside from the mere duties that are assigned to her.

The department of Household Economics in the College of Hawaii is fairly well equipped, considering the cramped quarters it at present occupies. The kitchen will accommodate eight students and is fitted with gas and electricity. Each girl has her own utensils in a conveniently arranged drawer and an individual gas burner over her desk. A practice dining room serves at present the double purpose of sewing room and lecture room. The various courses offered are personal hygiene and sanitation, textiles, selection and preparation of foods, house construction, sanitation and decoration. As the department develops it is hoped to extend the courses to include household management, chemistry of food, dietetics and other branches as needed. Besides the above, the student in the department is required to take work in English, German or French, art and design, chemistry, botany, history, physiology, zoölogy, economics and such others as she may elect. The enrollment at present is small and consists of special students, but interest in the work is manifested and there are reasons to hope that very shortly the department will have more than it can accommodate in the present temporary quarters. A correspondence course in the nature of extension work has been started, giving an opportunity to those on the other islands who cannot attend the college to have some aid in their difficulties. At present the work is confined to lessons on the selection and preparation of food.

The public schools have as yet no definite scheme in domestic science, sewing being taught in those schools where the teacher wishes. The pillow lace is being taught to some extent in the grades, but more attention is paid to it in the Girls' Industrial School. Several planta-

tion schools have introduced sewing, lace-making and mat-weaving, some specimens of which were exhibited by them at the Seattle exposition.

Another institution which is fulfilling a great need is the Kaiulani Home for Girls. Under the charge of Mrs. Heapy and her assistant, Miss Hosmer, some fifty working girls and school girls from the other islands find a comfortable home for a very small sum. Most of the work is done by the girls, although some few prefer to pay a larger sum and be excused from the work. A night school is maintained for those who wish to attend.

DOMESTIC SCIENCE IN THE NORMAL SCHOOL OF HAWAII.

FLORENCE MARGARET LEE.

The Normal School of Hawaii is composed of Chinese, Japanese, Portuguese, Hawaiian, part Hawaiians, Danes, Germans and Americans. They all speak English fluently and work together in perfect harmony. Honolulu is truly a small "melting pot" of nations.

The diplomas given at the end of a four years' course are of equal rank with those of the California State Normal School and admit a student to the College of Hawaii without examination.

The aim of the school is to train girls and boys to be instructors in any department of the school. With this end in view they spend a third of every day during their sophomore, junior and senior years as assistants in different classes, rotating each week. By this means the graduates have taught each year for six weeks in every grade, for this is also a training school. Daily plans are outlined by the teachers, and the student assistant elaborates these, thereby learning to express herself.

Domestic science was first started in this school on a very limited scale. In 1900 the principal, Mr. Edgar Wood, realizing the great need for it, decided to introduce it into the curriculum. As a special teacher could not be obtained until the department was proved to be a success, the manual training teacher took charge. The grade teachers brought their classes down to the little shed which served as a laboratory, and there the children prepared and ate their simple lunch.

It was about this time that a large fire occured in the "Chinatown" of Honolulu and from "fire sales" the little shed was equipped as a modest home kitchen. In 1905 this had proved so successful that the department of education erected a small building for domestic science and manual training, equipped a laboratory for each of these, and sent to the mainland for trained teachers.

It was then decided that a lunch should be cooked by the pupils and sold to the teachers and children at a nominal sum. The depart-

THE KITCHEN IN THE NORMAL SCHOOL OF HAWAII.

ment of education furnished all staple groceries and the lunch otherwise paid expenses and grew more and more popular until to-day it is being served to one hundred and fifty people daily.

The aim of this lunch was not to furnish food to underfed children, for extreme poverty did not exist there, but to obtain hand skill in cookery, to create a condition similar to that of daily life, and also to teach how and what to do by *doing*, the reasons to be given as the work was done.

The plan of work is that two girls from the fifth, sixth, seventh and eighth grades of the training school go every morning, according to a rotating system, to prepare the lunch dishes which need long cooking and to make bread. After the first kneading they go back to their classes but return for the second kneading, baking and sponge making. In this way each one actually does all the work, from the making of the yeast to the baking of the loaf.

Next follows the freshman class, so divided that each will have two days per week in the laboratory. In this class, as in all others, there is group work in the preparation of the lunch, the group changing each day to a different table and preparing a different dish. Chowders, soups, meats, vegetables, puddings, pastries, ice cream, etc., are served. For five cents a bowl of chowder or soup, a salad, or perhaps meat loaf with mashed potato, and two slices of buttered bread are sold. The majority make their lunch of this, but for an additional five cents there is ice cream and cake or some dessert. Five cents is the uniform price of all articles.

The cost of food is far greater in Honolulu than it is in New York City, yet this lunch is made to pay all expenses, the superintendent of education no longer considering it necessary to furnish supplies.

A difficult problem in planning this lunch is the consideration of the widely different tastes of the American teachers and the children of these various nationalities, for exactly the same lunch is served to all.

The seventh and eighth grades wash the dishes used during lunch, and thoroughly clean the laboratory. One-half hour is given to this.

An illustration of the kitchen is shown facing page 646.

Sewing is taught in the grades by the grade teachers, and dressmaking is taught in the normal department by the domestic science teacher. Like domestic science at the beginning it has a struggle for existence, there being no room and no equipment. It is hoped, however, that both may be secured in the near future.

REPORT OF THE PENNY LUNCH EXPERIMENT IN BOSTON, JANUARY 1 TO JUNE 30, 1910.

ELLEN H. RICHARDS.

At the Boston meeting of the American Home Economics Association the problem of feeding the school child was one of the subjects on the program. The account of the successful work with penny lunches accomplished in other cities stirred into action a long cherished plan of Miss Isabel F. Hyams, trustee of the Boston Consumptive Hospital, to furnish a penny lunch to the children in the Boston schools. With the hearty coöperation of the principal, Miss Emily Carpenter, and the teacher of domestic science, Miss Emmeline Torrey, the first penny lunches were served in the middle of the morning, at the Winthrop grammar school. The school kitchen was already fully equipped, so that the only expense necessary was for extra mugs, bowls, and trays, and $3.00 a week for a helper who assisted in preparing the sandwiches. This was supplied by Miss Hyams. On three days of the week, the regular cooking lessons were turned into the preparation of a hot luncheon; on the other two days, sandwiches and milk were offered. About 80 children were served on their school desks, a square of enameled cloth being used for protection. The children marched by the table and took the prepared dishes to their desks. Later the popularity became so great as to outgrow the original equipment and the committee added mugs and covers for 70 more children.

Meanwhile the Boston school committee had asked the Home and School Association to consider what could be done for the five or six-thousand anemic children reported as attending school in the various districts, the greater number being found in the Franklin, Lyman, Quincy, Wells and Hyde districts. The association passed the investigation over to its committee on hygiene, consisting of Ellen H. Richards, Chairman, Isabel F. Hyams, Lillian V. Robinson, and Dr. E. O. Otis.

Investigation revealed that in the most needy districts the schoolhouses were utterly lacking in facilities. There was no provision for hot water, sinks, stoves or space for the preparation of cooking,

or dishes to serve the food in. Funds for providing equipment for this limited experiment were furnished by Mrs. William V. Kellen, who generously financed the first luncheon experiments in the Boston high schools sixteen years ago and whose interest in the subject has never waned.

The centres established since the Winthrop are the Winchell, Franklin, Quincy and Norcross districts. In the Hyde school a helper was provided.

The Wells district with its nine divisions and most inadequate facilities was helped at the Winchell district by the coöperation of the Elizabeth Peabody House, where Miss Smith prepared the food in the kitchen of the house and sent it to the schools. Forty-five dollars was given to purchase the equipment and first supplies. To the Hyde school was given $30 to secure oversight and cleanliness in the serving of the two-cent lunch of malted milk and crackers.

At the Franklin school, where the experiment was begun in April, a corner of the janitor's room was curtained off for a kitchen, in which to prepare the food; the stove (gas) was in the furnace room. Here the children come to the basement for their lunches, as in many of the high schools; the food is placed on the tables ready for them, they deposit their money, take the food and pass along. The dishes are returned and washed by the helper and two of the school girls. The luncheon costs two cents in this school, as there is no school kitchen and a helper must be secured to superintend the preparation and serving of the food. This centre was equipped by the committee at a cost of $55.74 and since April has served 150 children a day.

The Rice school has a public school kitchen so that only the equipment for service mugs, bowls and spoons, was needed, these costing $23.70. The Norcross school only needed to be supplied with equipment for service, this costing $5.40. The Quincy school equipment cost $47.69, and that in the Warrenton St. school cost $5.40.

For use in all the schools, a piece of crash costing $6.25 was purchased. For service as needed at $3.00 per week $51 was expended. During April and May about 2000 pupils were served, and the total expense has been about $300.

Once the equipment has been provided the lunches have paid for themselves. This has been made possible only with the strictest management and by the purchase at wholesale of inexpensive food stuffs. About 2000 children are buying luncheons at the 10:30 recess for one or two cents, according to whether the lessons of the cooking

classes can or cannot be utilized. The teachers are unanimous in the belief that the luncheons are helping the children both physically and mentally. They are more attentive and interested in the lessons during the last hour of the morning and the result in their recitations gives the proof. To the earnest coöperation and interest of principals and teachers much of the success of the work is due.

The following dishes have been served: Pea soup with crackers; potato chowder; corn meal mush, with milk, sugar, and crackers; oatmeal and dates, with milk, sugar, and crackers; rice and prunes, with milk, sugar, and crackers; sandwiches (peanut butter, or jam), with a glass of milk; apple-sago pudding; rice pudding; Indian pudding; apple sauce and crackers; ginger cookies, with a glass of milk. The portion fills a large mug or deep oat-meal dish. The food selected has been chosen with care in regard to cheapness and to a high percentage of nutritive value. A distinct advantage was the possibility of buying all food at wholesale prices. The raw material costs one cent (if labor were counted, it would be one cent more) and yields an average of about 300 calories. The milk used is skimmed milk, costing at wholesale about three cents a quart, a valuable food for its cost, differing from whole milk only in the fat. This is made up by butterine, a cheaper product than butter, which has, however, as great a food value and is as easily assimilated in most cases.

The chairman of the committee took the responsibility for the use of these foods. There is probably less danger in this combination than in whole milk as commonly found to-day. The increase of lactic acid organisms in the skimmed milk tends, as Metchnikoff has shown, to crowd out others present, and the conditions of manufacturing butterine or oleomargarine renders it exceedingly improbable that disease germs can have access to the product. Sugar is one of the least expensive as well as the cleanest of foods and is used freely in our lunches. The best authorities apparently agree that under four ounces a day, the child may be allowed it freely. Flour in the form of crackers is also inexpensive and nutritious. Ferguson's bread proved to be well baked and well liked. There is little danger in loaf bread which is crusty and baked through. It is much to be desired that less expensive forms of tasty bread and muffins be provided. A larger patronage and wider experience will doubtless permit of greater variety, if found desirable.

The committee would like to put themselves on record as convinced of the value of the morning luncheon in the elementary school, and of the practicability of its adoption wherever those connected with the

school are prepared to take a little trouble and the authorities will put in the proper facilities—hot water, stoves, and the equipment for service.

There must also be a careful and conscientious supervision by some one with knowledge and authority. Much of the success in Boston, so far, has been due to the indefatigable zeal and thorough knowledge of Miss Hyams, who has given daily oversight to the work and has pulled the laboring oar of the committee's work.

The fact that the product of their lesson is of use to some one has proved an incentive to the classes in cooking and a spur to quick work, and it is in the interest of economical administration that a combination of the school lunch and the work of the school kitchen should some day be worked out.

The parents have, we think, appreciated what we have tried to do for the children. One woman, who earned her living by scrubbing office floors, asked her employer if he would pay her partially in pennies, and when as he told me, surprised at the request, he asked why, she answered, that her grandchildren went to the Winthrop School and they thought so much of their penny lunch, she wanted the pennies for them. Perhaps the best test of our work has been that other schools have demanded also the privilege of lunches. Some are working along the same lines we have followed. We feel encouraged to continue this work and I am sure Miss Hyams must for it is to her generosity of time, personal work and money, that each school as it made its plea of "Will you help us?" owes the details and arrangements. The equipment of bowls, mugs, spoons, cooking utensils and other necessary articles were furnished by the contribution of Mrs. Wm. V. Kellen. Several places however charge two cents for their lunches as they are either boys' schools or girls' schools with no school kitchen in the building.

The work is, then, done by one woman who gives her entire morning to the work, and the extra penny pays her salary. Our school was provided with an assistant whose salary was provided for by Miss Hyams.

If any of you can find a generous friend, sympathetic helpful principal, coöperative fellow teachers, and willing capable girls like ours I would suggest that you also start penny lunches and see how much pleasure they will give you in spite of the additional work, but you can not omit one of these elements and spell Success.

This lesson in inexpensive nutrition is of distinct value to the child and to the community. For the parents it is also an important lesson that not only food but the right food is necessary. To those who give

little children a penny to spend without any suggestion as to what to buy with it or where to buy it, this extreme care given to a luncheon must be a revelation and, in time, must tell for good. Careless parents do not notice when the child does not eat a nourishing breakfast, and even if a luncheon is taken it is frequently not appetizing and in many cases it is cold. The chairman of the committee believes that in the winter, at least, a cup of hot food acts as a mild stimulant to the digestive juices, so that the real value of the luncheon is doubled.

One of the worst habits of children of this early age is the patronizing of the candy and pastry shops. Sugar is valuabe if it is pure, since it goes so quickly into the circulation without taxing the body fluids, and there is a reason for the child's liking for candy, but it should be of the best quality. This recess lunch does not interfere with a parent's responsibility, because it comes at a time when they cannot provide more than the money, which they nearly all do, but it insures real nutrition for the penny. From it the parents may learn the value of foods and the children will learn to choose such things as are good for them to eat in the midst of school hours.

The committee deprecates the giving of supplies to a school. It believes the children should pay for what they get and that the price should be in proportion to the cost for this very reason—the teaching of values. If anything is to be given, it should be the equipment, which is the public property of the school and lasts for some years.

To-day education cannot take cognizance simply of intellectual matters, but must recognize the attainment of the child's efficiency through the physical side as well. The hundreds of children who have had six weeks' feeding in these schools show the results in increased weight, better color, and more receptive and active minds.

The time of eating and quality of food does not interfere with the noon meal nor has it lessened the furnishing of breakfast, in any observed cases, by parents. It seems to be a feasible remedial-preventive measure, involving no serious odors or garbage about the school house.

One criticism is sure to be made on the handling of these luncheons in school buildings by the regular teachers not dressed in cooking-school costume. That the standards of superficial nicety are not kept up might be said, but it would raise the cost, since it is the polish and specklessness that doubles or even trebles the price of prepared foods.

The service, though simple, is educational, as everything is done in

good taste and in a cleanly way. It is carried out with little friction. In the Winthrop school, word is sent the day before to the kitchen as to how many lunches each room desires. At the close of the afternoon, trays are placed about the room, each in its assigned place, so that there shall be no confusion and all will be in readiness for the next morning. When ready the trays are carried to the various rooms, and the food served at the desks, each child having a doily of enamel cloth. When bread or a cracker is served with milk a disc of metal instead of a plate is placed on top of the mug to hold the bread. When the children have finished, the mugs are collected, returned to the kitchen and washed by the children.

WHAT SHALL BE DONE ABOUT IT NEXT YEAR?

An extension of this work might be taken up for the "shut-outs." It has been reported that several hundred children in the city are locked out of their homes at noon and left to roam the streets. It was hoped in the Hyde School that a noon class might be formed to prepare their own noon meal and, prehaps, prepare a part at least of the penny lunch, but various obstacles prevented the trial. It is hoped that some such plan will be inaugurated somewhere next year. Further work of hygienic value should be undertaken in coöperation with this work to provide hot water and towels, or, in other words, possibilities for clean hands in the school. Clean food eaten from dirty hands is of little avail.

This is but a part of the whole social problem—and the "breakfastless" child is the result of bad hygienic conditions of the modern tenement house rather than of poverty or the unsolicitous mother—for there are not many of the latter.

The committee feels certain of the splendid results obtained, and believes the work should be extended, emphasizing, as an important factor towards its success, first, constant supervision by one who has a knowledge of food values and prices and the place of food in the modern educational scheme, and, second, the necessity of funds to draw upon for equipment in starting the work promptly and efficiently.

Miss Lillian M. Towne has been recently added to the committee and much is hoped from her intimate knowledge of the school needs and conditions.

ACETYLENE GAS AS FUEL FOR A DOMESTIC SCIENCE KITCHEN.[1]

MISS JOAN HAMILTON.

Supervisor of Domestic Science, Regina, Saskatchewan.

The public school board brought me here last summer to introduce domestic science to the schools of the city. The first thing was to equip a class-kitchen. My board was willing to provide everything necessary for a good equipment, but my nearest neighbor in domestic science was across the prairies in the next province, and the dealers required a good deal of education in the "fitness of things." Most of our difficulties have now been overcome and we have made a satisfactory beginning with the two branches of sewing and food preparation.

Our greatest problem was to provide satisfactory individual stoves for twenty-four girls around the ordinary hollow square table, and the following notes on our experience may prove helpful to other pioneer teachers in similar circumstances.

Choice of fuel.—Coal gas was impossible. Many were the kerosene stoves offered, but most of them were too high and too unstable. One looked promising, but proved difficult to control and the possibility of twenty-four of them pouring black, greasy smoke into the room was too much for the board. Satisfactory alcohol stoves could be had but denatured alcohol is $1.50 a gallon, and the board finally decided upon acetylene gas.

Plumbing, etc.—This was the same as for ordinary coal gas, but with a different burner in the stoves.

The stove.—An individual stove with 3-inch legs, the flame-bars arranged spoke-shape and encircled by an iron ring 8 inches in diameter. This is the stove on the market, which we have modified to our use by cutting off the legs as short as possible and fastening an iron plate over the top to hold small pots. The flame bed is far too large

[1] Presented at the Boston Meeting of the American Home Economics Association, January, 1910.

and we are devising means to cut the gas off from the end holes of the spokes until such time as the manufacturers put a small stove on the market. This stove is made in the United States.

Cost of installation, including the machine, stoves, plumbing, etc. was $317.40. In this connection it might be remembered that western prices for both goods and labor are high in comparison with eastern prices.

Carbide.—Rice carbide could be purchased in Merritton, Ont., at $100 per ton laid down in Regina.

Management.—This is very simple. There is no storage chamber in our machine. The janitor turns a stop-cock at the machine and when the stoves are lighted the gas generated. The janitor removes the sludge three times a week and puts in as much water as he removes sludge. Full and clear directions accompany the machine.

In lighting the burners we had at first some trouble with the flame flashing back. This is a very noisy and nerve-racking thing, but is overcome as soon as the operator learns to light the burner properly.

Feasibility as a class-kitchen fuel.—Acetylene is much cleaner than coal gas, with a more even and certain heat, and the heat is very intense. So far I like it much better than coal gas and think it will prove a superior fuel when we get a suitable stove. At present we have twelve inches of flame when two inches would do the work.

Cost of running in comparison with ordinary gas.—We cannot yet make satisfactory comparisons. The plant has been running but a short time and as it is something new the members of the board bring many visitors. Each time one or more burners are lighted and I am not always at hand to note the length of time they are in use. Again, there was at first a considerable leakage through an undiscovered sand-hole in a basement pipe. We are, however, planning to keep careful account of the amount of carbide used in a given time for a given number of students. At present our belief is that it is not an expensive fuel.

NOTE ON THE SETTING OF GELATINE.

OLIVE GAIR PATTERSON AND C. C. BENSON.[1]

Laboratory of Physiological Chemistry. University of Toronto.

A number of factors are said to influence the formation of a good jelly from gelatine, such as the need of a small amount of calcium and the avoidance of continued boiling. Experiments have therefore been undertaken to study these factors and to learn how far they do influence the gelatinizing power.

In the first place pure sheet gelatine was used as being the purest commercial product obtainable. This contained 2.2 per cent of mineral matter and gave positive tests for calcium. If calcium is necessary to the setting of gelatine as it is for the clotting of milk and coagulation of blood, continued washing to remove the ash (and in it the calcium) should destroy the power of forming a jelly. This was not found to be the case. The gelatine was dissolved in water (2 gms. in 100 cc.) and washed in many changes of distilled water for some days and dialyzed for several days more against distilled water. Four weeks of such treatment produced a gelatine containing only 0.01 per cent of ash and yet forming a good jelly. The ash in this case was obtained by carbonizing, extracting any soluble mineral matter, and then ashing the residue. The extract contained no ash, all the mineral matter being in the insoluble part.

The gelatine used gives a good tyrosin (oxyphenyl) reaction with Millon's reagent, although the tabulated records of gelatine composition show the absence of tyrosin. Tyrosin seemed therefore to be an impurity in the brand used, but was also found in other commercial specimens tested. The washing for four weeks with distilled water and dialyzing with distilled water did not produce a gelatine giving a negative Millon's test, but on dialyzing another solution of gelatine (2 gm. in 100 cc. hot distilled water) against running tap water for four weeks, it was found that the solution no longer gave

[1] Presented at the Boston Meeting of the American Home Economics Association, January, 1910.

Millon's test. The solution had, however, become diluted. When it was carefully evaporated down on a water bath and left in the cold it set into a clear, firm jelly. Gelatine may, therefore, be freed of its mineral matter and tyrosin-holding impurities without affecting the gelatinizing power of its solutions.

The influence of boiling on gelatine solutions has also been tested. Two grams of gelatine dissolved in 100 cc. of distilled water were boiled under a reflex condenser. After one hour's boiling the solution still set into a firm jelly. After five hours it formed a jelly but not so firmly. After seven hours, a soft jelly formed on standing over night, and after ten hours a soft jelly could be formed only by concentrating to half the volume. A process of hydrolysis had evidently been going on, for on "salting out" these solutions with ammonium sulphate at half saturation and complete saturation, different fractions are obtained. After one hour's boiling the first fraction is larger than the second but after five hours boiling the second fraction is the larger. After five hours boiling even complete saturation with ammonium sulphate leaves in solution a body which gives a positive biuret reaction. A few minutes boiling did not at all injure the jelly-forming power but made a clearer jelly when the mixture set.

Further experiments are being made to test the effects of boiling and some tests have already been made with solutions containing citric and acetic acids, since in jelly-making processes acids from fruit juices are generally present. Four per cent gelatine solutions containing citric acid to a concentration of one per cent still set in the cold after fifteen minutes boiling but after ten minutes boiling of a three per cent solution with 0.5 per cent citric acid the gelatinizing power had been considerably decreased. More work is needed before definite results can be obtained and this will, we hope, be done during the coming session.

A DAY'S METABOLISM.[1]

C. C. Benson, M. B. Tamblym, and Students.

University of Toronto.

In the spring of 1907 some experiments were made in the hourly examination of renal excretions. The value of these experiments was much increased by a knowledge of the nitrogen intake. The household science department kindly provided a day's meals on two occasions and furnished data giving all necessary information. The amounts of food eaten were carefully weighed, their composition assumed from Atwater's tables, and the nitrogen content calculated accordingly. The meals were taken from sets of meals, the actual food for which could be purchased in Toronto at 25 cts. per person per day. The meals were prepared and the weights determined.

In the experiment here referred to, the breakfast consisted of farina with dates, omelet, graham muffins with butter, toast, coffee and milk. The dinner was soup, roast beef, potatoes and cabbage, potato biscuit, Spanish cream and water; and the supper was baked beans and brown bread, fruit salad with maple biscuits, butter, tea, milk and sugar. This made a total weight of 2022 gms., giving 1540 gms. of water, 72.25 gms. of protein (11.56 gms. nitrogen), and 2212 calories of energy.

The urine was collected at intervals of about one hour from 7 a.m. to 7 p.m. on the day of the experiment and also in toto for the 24 hours. The samples were analyzed as required by the nature of the experiment. The total excretion amounted to 1248 cc. and contained 9.74 gms. of nitrogen. The fecal nitrogen amounted to 1.38 gms. There was therefore, a nitrogen balance of +0.44 gms. for the 24 hours. Phosphorus determinations were also made by titrating with standard uranium acetate solution. The total excretion of phosphorus for the 24 hours was 0.70 gms. The sodium chloride excreted was 7.2 gms.

We have here only outlined a single metabolism experiment for one day. Others of a similar kind have been undertaken with the coöperation of the household science and physiological chemistry departments, in some of which the whole work has been carried on by students. We hope to continue such experiments and feel that these two departments can be of great assistance to each other in such ways.

[1] Presented at the Boston Meeting of the American Home Economics Association, January, 1910.

A REVIEW OF RECENT SCIENTIFIC LITERATURE BEARING ON DOMESTIC ART.[1]

C. F. LANGWORTHY, PH.D.

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For many years American investigators and teachers have made a systematic attempt to follow the reports of experiments which have to do with the general subject of food and nutrition. Such work is very extended and constantly increasing, as may be seen by comparing the amount of space it now occupies in such reference journals as the *Experiment Station Record* and *Chemical Abstracts* with that required in earlier volumes. Furthermore, a great deal of attention has been paid to collecting and summarizing the literature of food and nutrition in connection with the nutrition investigations of the Office of Experiment Stations. Perhaps it was because food and nutrition bore so obvious a relation to well established branches of science such as medicine, physiology, physiological chemistry, and physics that the workers in this subject naturally followed the methods with which they were familiar in the study of the older and more well established branches. Then, too, it must be said that although much of the literature pertaining to the subject of food and nutrition is published in foreign journals and reports not usually found in libraries in the United States, a large part of it can be found in journals which are well known and readily accessible. A fairly extended survey of scientific journals, reports of learned societies, and similar material leads to the conclusion that scientific literature bearing on domestic art is more scattered and less easily accessible.

Just why this should be the case it is difficult to say, but the fact remains that no attempt comparable with that made in the case of nutrition has been made to collect and digest systematically the scientific material which bears upon the subjects included under the general heading domestic art. Perhaps one reason is that what we

[1] Presented at the Third Graduate School of Home Economics, Ames, Iowa, July, 1910.

know as domestic art has such an obvious relation to æsthetics and to the fine arts in general, as well as to technical subjects related to the principal activities of the home, that the teacher has found a sufficient amount of material of this character to provide extended courses of instruction and has not been forced to fall back upon the laboratory for fundamental facts in the same way as the teacher of physiological chemistry. Be that as it may, it is certainly true that domestic art may be approached from the laboratory and that it must be if it is to mean more than discriminating taste and skill in household activities. It is well recognized that it does mean more than this, as is obvious from the character of the work which is being carried on in so many of our schools and colleges.

Since domestic art has to do with such a wide range of topics and so many materials, it is to be expected that numerous branches of science would contribute facts of interest to the domestic art student. Even a cursory survey of current scientific and technical literature shows that such is the case and that a wealth of material is being provided which only needs gathering and interpretation to prove of great value. With the idea of finding out something of the character and extent of this material the attempt has been made in this paper to bring together references to recent literature which seem of importance in the discussion of domestic art problems. It is recognized that the list of references is not complete and that the result is not all that might be desired. It is hoped, however, that enough has been done to prove the correctness of the contention that current scientific literature contains much material of fundamental importance to the domestic art teacher who wishes to see the subject recognized as one which is as worthy of serious study as engineering, medicine, or other branches of learning, and one which may be approached by similar methods.

For convenience the material collected has been grouped under a number of general headings such as textiles and clothing, laundry materials and methods, building materials and household articles, illuminants and fuels, and hygiene and the home.

TEXTILES AND CLOTHING.

The value of textiles for use as clothing is dependent upon a number of physical properties, one of which is the permeability to air. From a theoretical standpoint this is a physical problem which is

dependent upon the laws governing the passage of gases through capillary tubes or openings, cloth being, of course, for all essential purposes a system of very short capillary tubes. At the Hygienic Institute of the University of Leipsic, P. Schmidt (*Arch. Hyg.*, 70, 1909, No. 1-2, p. 8) has studied this problem and expressed his results in mathematical form. He concludes that under experimental conditions the passage of the air through the cloth followed the law for capillaries, the quantity of air passing through being proportional to the pressure and indirectly proportional to the resistance. When expressed in the form of curves the results with thin cloth with open meshes, such as flannel, batiste, etc., showed that the curves were combinations of straight lines and parabolas. A practical conclusion from the work is that materials differ in their resistance to the passage of air currents, that this resistance is a measurable quantity, and that it should be taken account of in the rational selection of clothing for different climates and different conditions. The experimental method is described and could be easily adapted to students' laboratory work.

K. B. Lehmann and J. Siegler (*Arch. Hyg.*, 66, 1908, No. 4, p. 297) have studied the relative power of woolen and cotton to absorb perspiration, particularly with reference to the use of cotton and woolen stockings in the German Army. They conclude that when cotton stockings are worn over woolen stockings the perspiration is quickly withdrawn from the woolen, since cotton has a decidedly great power of absorbing water and the feet do not remain damp. When the conditions are reversed and the cotton is worn next the skin the moisture remains in the stockings as wool does not withdraw it readily from the cotton and carry it off. The results are discussed particularly with reference to Cramer's conclusion that the readiness with which sodium chloride in perspiration passed through clothing is an important factor in considering its hygienic value. Cramer's work, which was published in 1890, had to do with the relation between clothing and the functions of the skin.

The results of such investigations as these are very important for the intelligent discussion of the problem of clothing. Those who attended the Summer School at Ithaca will recall that Prof. Zuntz spoke at length of his work on clothing in relation to comfort and his conclusion that a double-faced cloth was preferable for severe exercise, the upper surface being of such a nature that it would absorb the moisture given off by the body and permit much to be readily evaporated, while the under surface, which had opposite properties,

would hinder a sudden chilling of the surface. He called attention to the fact that the material was less important than the character of the fabric and that with modern factory methods it was possible to treat fibers in such a way that both qualities could be obtained with the same material and that an all-wool or all-cotton fabric could be made which was double-faced and would fulfil the desired conditions.

The relative value from a hygienic standpoint of clothing of different colors in intense sunlight was studied at the Hygienic Institute of the University of Leipsic by P. Schmidt (*Arch. Hyg.*, 69, 1909, No. 1, p. 1). A full account of the experimental methods which he followed is given in his report. Of thick materials through which air does not pass readily, that is, such goods as are often chosen for summer clothing or such as are often worn in the tropics, he concludes that white is more hygienic than dark colors. In the case of thin materials through which air readily passes, preference is to be given to dark materials, provided the clothing is loose and does not hang close to the body; in other words, by such garments as the Japanese kimonas, the thin silk pajamas, and similar garments which are commonly worn in the tropics. The ventilation of such clothing is affected not alone by its porosity, but also by wide sleeves and loose trousers.

Sunstroke, the author concludes, is not caused by the ultraviolet rays, as has been claimed, but to the fact that the bright rays of light penetrate deep into the body, and being absorbed, are converted into heat. In a study of the efficiency of various sorts of clothing as protection against sunstroke, his conclusions are not favorable to the English goods which have been advocated, which are white on the outside and red underneath.

Many other questions which have to do with clothing in hot climates and hot seasons are also studied and the investigation as a whole is a good illustration of the attempt to study the hygiene of dress by scientific methods.

A reference to this problem naturally suggests the elaborate discussion of the question of protection by the color of the skin, the protective power of clothing, and other similar questions which have to do with life in the tropics included in the volume recently published by Major Charles E. Woodruff, of the U. S. Army, entitled *Expansion of Races*. He has also published a paper on *The Effects of Tropical Light on White Men*, which is concerned with the same question. Major Woodruff's conclusion is that owing to the color of their skin, the brown and black races are naturally protected from the harmful

effects of the bright sunlight of the tropics, and that it is impossible for the white races to attain a complete immunity by special clothing or other modifications of their usual living conditions.

There are many other questions having to do with fibers and textiles which have been studied experimentally, including dyes and dyeing, the action of light on color, the detection of adulteration of fibers and fabrics, and similar topics. In summarizing such work mention should be made of L. A. Olney's volume on *Textile Chemistry and Dyeing* (Chicago: Amer. School of Correspondence, 1909, pp. xi + 343), and Prof. J. M. Matthews' *Laboratory Manual of Dyeing and Textile Chemistry* (New York: John Wiley & Sons; London, Chapman & Hall, Ltd., 1909, pp. xii + 363). An interesting theoretical discussion of the dyeing of textile fibers is presented by S. H. Higgins (*Chem. News*, 99, 1909, No. 2576, p. 169) in a recently published paper.

A paper by P. G. Jones (*Jour. Soc. Dyers and Colourists*, 26, 1910, No. 6, p. 147), entitled *Some Observations on the Action of Light on Finished Dyed Cotton Goods*, is of decided interest in connection with the wearing quality of colored goods, and it seems fair to say that such data as the author reports must be taken into account in an intelligent discussion of the selection of materials and permanency of color. It is the generally accepted theory that the fading of color on exposure to light is due to an oxidation process, and this question is discussed by Jones, and some data reported which have to do with the theory that perhaps reduction may also be involved. As regards the technique of cotton dyeing, he found that the use of dextrin with alizarin oil in finishing had a very favorable effect on the fastness of color.

Papers of similar character to the one noted are very numerous and are published in such journals as the *Journal of the Society of Dyers and Colourists*, issued at Bradford, England. Some of the abstract journals include such work.

The study of the detection of the adulteration of fabrics reported by Miss Nellie Crooks (*Harper's Weekly*, 54, 1910, March 5, p. 11) is of course familiar to all and is a good example of a paper which is of importance from a practical as well as from a laboratory standpoint.

As a contribution to the subject of the examination of textile fabrics may be mentioned G. Tagliani's paper (*Rev. Gen. Mat. Color.*, 13, 1909, p. 221; abs. in *Chem. Abs.*, 3, 1909, No. 22, p. 2755) on methods of the Italian Customs Service for detecting sizing in cotton goods. The official method is described and a modification proposed.

A discussion of the question of the subject of fibers and textiles should take account of at least a few of the volumes which have been published on this subject in recent years. In *The Structure of the Wool Fiber and its Relation to the Use of Wool for Technical Purposes* (London: Macmillan & Co., Ltd., 1908, pp. xx + 475), F. H. Bowman discusses classification of fibers, the origin and development of the hair, and a great variety of questions concerned with the wool raising industry, the chemical composition of wool, the action of reagents on wool, theory of dyeing and color, and related questions. Attention is especially directed to his chapter on methods of analysis and the detection of various fibers.

Daniel Zolla's book on textile fibers of animal origin (*Les Fibres Textiles d'Origine Animale*, Paris: O. Doin et Fils, 1910, pp. ix+ 362) is a fairly exhaustive study of wool and other fibers from an industrial and statistical standpoint, though a considerable amount of scientific data are also included.

A very important work on this subject which was published a little earlier than most of the material referred to in this summary is Prof. J. M. Matthews' volume entitled *The Textile Fibres: Their Physical, Microscopical and Chemical Properties* (New York: John Wiley & Sons, 1907, pp. viii + 480; London: Chapman & Hall, Ltd). It contains data on the chemical nature and properties of wool and hair fibers, silk, cotton and other vegetable fibers, mercerized cotton, artificial silk, and chapters on the quantitative and qualitative analysis of textile fibers.

Though published somewhat earlier than the bulk of the material included in this summary, it seems desirable to mention Bersch's volume, translated from the German by W. T. Brannt, entitled *Cellulose, Cellulose Products, and Artificial Rubber* (Philadelphia: Henry Carey Baird & Co; London: Kegan Paul, Trench, Trübner & Co., Ltd., 1904, pp. xxi + 345). This volume treats of the preparation of cellulose from wood and straw; the manufacture of parchment; methods of obtaining sugar, alcohol, and oxalic acid; the production of viscose and viscoid, nitro-celluloses, and cellulose esters, artificial silk, celluloid, rubber substitutes, oil-rubber, and factis. In other words, this volume supplies a great amount of information regarding the manufacture of mercerized goods, artificial silk, and many other similar products, including their chemistry and technology.

LAUNDRY MATERIALS AND METHODS.

Many investigators have studied problems which have to do with the materials used in the laundry or with the processes which are applied in laundry work.

W. Kind (*Die Wirkung der Waschmittel auf Baumwolle und Leinen*. Wittenberg, 1908; abs. in *Ztschr. Chem. u. Indus. Kolloide*, 5, 1909, No. 2, p. 84) studied the effect of various washing materials on cotton and linen and reached the conclusion that not only did water glass (sodium silicate) injure fibers, but many other alkaline substances such as soda. The rapid destruction of garments, etc., in laundries, he states, is not always due to the use of chlorin as a bleaching agent but very often is to be ascribed to the action of alkali. It is doubtless well known to all familiar with laundry processes that excessive alkali is injurious, but nevertheless it seems not uninteresting to be able to substantiate opinions by the results of carefully conducted laboratory work.

Data on the detergent power of soaps have been reported by W. Spring (*Ztschr. Chem. u. Indus. Kolloide*, 4, 1909, No. 4, pp. 161-168). The experiments reported in this paper have to do with the methods and theories of colloidal chemistry, and it is difficult to present the material satisfactorily in the limits of a brief abstract.

Of interest in connection with laundry work are such papers as Dafert's and Wolfbauer's study (*Oesterreichische Chemikerzeitg.*, 1908, No. 12; abs. in *Ztschr. Chem. u. Indus. Kolloide*, 5, 1909, No. 2, p. 84) of the effect of resin soaps, which they conclude are of less value than pure fat soaps and which impart a distinctive color to fabrics washed with them.

J. Leimdorfer (*Augsburg Seifensiederzeitg.*, 35, 1908; abs. in *Ztschr. Chem. u. Indus. Kolloide*, 5, 1909, No. 2, p. 84) studied experimentally the effect of different materials used in laundry work.

The disinfecting power of soap has been frequently studied, and perhaps the mention of a paper on this subject published by H. Reichenbach (*Ztschr. Hyg. u. Infectionskrank.*, 1908, pp. 296; abs. in *Ztschr. Chem. u. Indus. Kolloide*, 5, 1909, No. 2, p. 84) will suffice for an illustration of such work. In general, it was shown that the disinfecting properties are dependent upon both alkali and the salts of fatty acids obtained from the hydrolytic cleavage of the soap rather than from either group alone. These papers and many others which have to do with soap are included in an annual review of the soap

industry by F. Goldschmidt (*Ztschr. Chem. u. Indus. Kolloide*, 5, 1909, No. 2, pp. 81-85), published in a German journal devoted to chemistry and colloids, a journal which seems well worth the attention of students of all branches of Home Economics, as the newer theories which are brought together under the head, Colloid Chemistry, have a wide application in many of the subjects which pertain to plant and animal life as well as many industrial processes.

The question of the nature of the soapsuds or the soap bubble is one which seems to interest many persons. It can be the better answered by reference to investigations of this subject which have been brought together by C. Stiepel (*Augsb. Seifensiederzeitg.*, 35, 1908, pp. 331, 396, 420; abs. in *Ztschr. Chem. u. Indus. Kolloide*, 5, 1909, No. 2, p. 84). It appears that the formation of suds is dependent upon a condition of dissociation in the soap, that is, upon the presence of water-soluble soap and free fatty acid or acid soap. The presence of free alkali is a help when it insures a sufficient amount of soap in water-soluble form, that is, by reversing the dissociation of the soap, which would continue until a condition of complete insolubility was reached, provided all the free alkali was removed.

The question of the disinfection of clothing and other materials, dwellings, etc., is receiving a great deal of attention at the hands of investigators. As an example of such work may be mentioned G. Sobernheim's paper (*Arch. Volkswohlfahrt*, 2, 1909, No. 12, pp. 708-717; 3, 1909, No. 1, pp. 12-14) on newer methods of house disinfection which summarizes data on the subject and directs attention to the great advance which has been made since formaldehyde has been available as a common market commodity and satisfactory methods have been found for using it.

The question of the efficiency of ordinary laundry methods as sterilizing agents is one which often arises and apparently is generally answered by an expression of opinion one way or another, most persons holding that the soapsuds and hot water used in washing clothes and the heat required in ironing them should be fairly efficient. However, we are apt to recall that the period of immersion in hot water may be short and that the mangles and ironing machines employed in laundries may not be hot enough or used for a long enough time to insure sterilization. It is therefore of interest to know that K. Svehla (*Arch. Hyg.*, 70, 1909, No. 4, p. 373), of the Hygienic Institute of the University of Prague, studied the disinfecting power of pressing with a hot iron, particularly with reference to its use in disinfecting the

clothing of physicians and attendants in cases of contagious diseases. He concludes that pressing with a hot iron is a simple and good method of sterilizing clothing and states that in his own practice he uses a long linen coat or mantle which is sprinkled and pressed each time it is used. Such a coat can be worn in the sick room and left with the family for pressing. This does not involve a great amount of work, and it seems a simple prophylactic measure.

Bleaching, as every one knows, is an important laundry process and will be the better understood by one who is familiar with K. J. P. Orton's and W. J. Jones' study of A Crystalline Bleaching Powder (*Jour. Chem. Soc.*, London, 95, 1909, I, p. 751), which was recently published.

Papers which have to do with drying machines for chemical work have been reported by W. B. Ruggles (*Met. Chem. Eng.*, 8, 1910, p. 177; abs. in *Chem. Abs.*, 4, 1910, No. 12, p. 1655) and W. E. Wadman (*Met. Chem. Eng.*, 8, 1910, p. 176; abs. in *Chem. Abs.*, 4, 1910, No. 12, p. 1655). As these papers have to do with conditions which effect efficiency, they are of possible interest in connection with devices for drying clothes in laundries on a commercial scale or in the home or farm laundry. Fortunately, the possibility of equipping the home or farm laundry with mechanical devices which lessen labor has been demonstrated by work such as that of Washburn.

BUILDING MATERIALS AND HOUSEHOLD ARTICLES.

No one can deny that the most intelligent use of building materials depends upon a knowledge of their chemical and physical properties. A great deal of work is being published at the present time which has to do with the character of cement and with various problems concerned with its use. Similar work is also published regarding asphalt, wood products, and other materials. Papers of this character are published in a great variety of journals and reports, but the work is regularly abstracted in *Chemical Abstracts*, published by the American Chemical Society. As an example of the work with wood may be mentioned H. Wislicenus' paper (*Z. Chem. u. Ind. Kolloide*, 6, 1910, pp. 17, 87; abs. in *Chem. Abs.*, 4, 1910, No. 12, p. 1621) on The Colloidal Processes of Wood Formation and the Nature of Wood and Lignin. The author discusses from a physiological and theoretical standpoint the nature of wood, lignin, and the wood-building process. Wood, he states, considered after the original cellulose formation in the plasma,

is the result of colloidal chemical processes, dependent on gelatinization and colloidal absorption. Lignin is one of the colloids precipitated from the sap, of which one part enters reversibly, and the other part irreversibly, the cellulose structure. Early spring sap shows a low colloid content which increases as the leaves of the tree of plant develop, while sap in July and August, during the growing period, is high in colloids.

As an example of another sort of work may be mentioned a paper on Treating Timber with Crude Petroleum as a preventive of decay, which was published by C. M. Taylor (*Chem. Eng.*, 11, 1910, p. 35; abs. in *Chem. Abs.*, 4, 1910, No. 12, p. 1667), and the question of The Strength of Treated Timber embodied in the Report of the Committee on Wood Preservation of the American Railway Engineering and Maintenance of Way Association (*Chem. Abs.*, 4, 1910, No. 12, p. 1668).

Glass, pottery, and porcelain are of great interest and importance in the home, from the standpoint of decoration as well as that of utility. Technical studies which have to do with these materials are numerous and are well worth the attention of students and teachers. As illustrations may be mentioned the paper on The Foundations of Stained Glass Work by N. Heaton (*J. Roy. Soc. Arts*, 58, 1910, pp. 454, 485; abs. in *Chem. Abs.*, 4, 1910, No. 12, p. 1658), which contains chemical formulae which have to do with the technique of stained glass, and likewise with the chemistry of the ground or sheet glass, the pigments, metallic oxids, etc., used to give color, and the technique of fusion, etc., and also include the chemistry of the processes involved.

A contribution to the same subject is made by E.Grieshammer (*Sprechsaal*, 43, 1910, pp. 153, 165; abs. in *Chem. Abs.*, 4, 1910, No. 12, p. 1658) in his paper on The Solubility of Metallic Sulphides in Glass.

The effectiveness of insulating materials is a matter which concerns the household as well as the cold storage industry. It is self-evident that the heating problem in the home is a question of insulation, as is also the problem of the effectiveness of a refrigerator or ice chest. For this reason such a paper as W. D. A. Bost's (*Cold Storage and Ice Assoc. Proc.*, 8, 1909, No. 2, p. 89), entitled Apparatus for Determining the Conductivities of Insulating Materials, is of interest. This gives an illustrated description of the apparatus and methods employed in discussing insulating problems with special reference to cold storage, but the apparatus and methods could be easily adapted to the study of household materials by students in the laboratory.

W. Hoffmann (*Arch. Hyg.*, 68, 1908, No. 1, p. 54), at the Hygienic and Chemical Laboratory of Emperor Williams's Academy for Training Army Physicians, studied the heat conducting power of linoleum of different sorts and found that the conducting power of linoleum was dependent upon the proportions of cork and linoxym used in its manufacture. The linoleum which was poorest in this respect was a much better conductor of heat than wooden flooring and it was therefore the less efficient for this purpose. Wooden floors without linoleum were found to be poorer conductors of heat than floors made with a thick layer of plaster-of-Paris compound covered with linoleum. These investigations are of interest not only for their obvious relation to the economical heating of houses or other apartments and the comfort of warm floors but for the information they give relative to experimental methods.

ILLUMINANTS AND FUELS.

H. Benndorf and W. Prausnitz (*Arch. Hyg.*, 66, 1908, No. 4, 384), at the Physical and Hygienic Institute of the University of Graz, have studied the illumination of rooms by sunlight and described apparatus for estimating the proportion of light and shade under different conditions.

The relative hygienic value of different methods of artificial illumination is a very important matter and one which has to do not only with health but also with problems which pertain to ventilation. S. Rideal, in The Relative Hygienic Values of Gas and Electric Lighting (*Jour. Roy. Sanit. Inst.*, 29, 1908, No. 2; also published in book form), has reported a comparative study of the hygienic value of gas and electric lighting with special reference to the condition in dwellings. In this work he has taken into account structural and lighting conditions, ventilation, the character and distribution of products of combustion and respiration, organic matter in the air, effects of gas leaks with special reference to carbon monoxid, physiological data such as pulse rates, respiration frequency, blood pressure, the number of blood corpuscles, animal heat and body temperature, body weight, mental fatigue, time reaction, eye fatigue, and other similar data, and a special experiment as to the poisonous effects of coal gas. Not only does his report represent a large amount of interesting original work, but it may also serve as a manual for the study of such problems since methods are described in considerable detail.

Quotations from the author's discussion of his results indicate the character of the conclusions which were drawn from his observations:

With natural ventilation the proportion of carbonic acid in the air was practically identical for both illuminants (gas and electricity).

The ventilating effect of the gas burners has thus proved competent to carry off the whole of their products, or an equivalent amount of the products of respiration.

It is therefore not surprising that the search for the physiological effects of lighting by gas has been in the main a fruitless one.

The fifteen men have been subjected on more than fifty occasions to some 6,000 tests of the kind best calculated to detect any such falling off in condition as might be expected to take place under either mode of illumination. The results of these tests have been carefully examined and averaged, and, with few exceptions, they absolutely fail to disclose any measurable difference between one mode of lighting and the other. Not only so, but in no case do they show any deviation from any normal conditions. It is not merely that the changes noted were well within the limits of accommodation. If this were all it would be a very poor answer to the question propounded, for it would obviously be unsatisfactory that a system of lighting should trench, no matter how slightly, upon that power of accommodation on which the body depends to safeguard it in the presence of adverse influences. Not only were the limits of accommodation never exceeded, but they were in no case even distantly approached, and the conditions which the physiological tests disclosed were in all cases entirely satisfactory. The differences found between the two lights were so small as to be absolutely devoid of any hygienic significance; they were, in fact, much less than those that are constantly produced in healthy subjects by slight changes in their condition or environment.

There may be, and doubtless are, persons so peculiarly constituted as to find one light or other objectionable, or even to be unable to tolerate any artificial light whatever. Such cases belong to the domain of pathology rather than that of hygiene. On a review of the whole of the facts collected, it may be said, without reservation, that there is nothing is either mode of lighting which is incompatible with the best hygienic conditions.

Owing to the better ventilation obtained by gas, the products of combustion are not found in the air in anything like the proportion which might be expected, the temperature and humidity in an occupied room being no greater than when the room is lit with electric light.

Carbonic acid has not the injurious effect which was formerly attributed to it, but considerable rises in the temperature and moisture content of a room, from whatever source, do have a prejudicial effect upon the well-being of the occupants. Even under adverse conditions of ventilation purposely created for this inquiry, neither the temperature nor percentages of moisture in the room reached a point at which any such effect could be detected by any of the recognized physiological tests.

It has been established that the products, viz., heat, carbonic acid and moisture, so far as they modify the health of the occupants of a room, are derived from the inmates more than from the illuminant, and that a room of moderate size can be efficiently lighted by gas without sensibly affecting the amount of these three factors.

The medical conclusions are in accord with those arrived at from the chemical and physical data, and also demonstrate that the choice between the two systems of lighting does not depend upon hygienic considerations.

The practical testing of gas and gas meters has been considered by C. H. Stone in an exhaustive manner in a recently published volume entitled *Practical Testing of Gas and Gas Meters* (New York: John Wiley & Sons; London: Chapman & Hall, Ltd., 1909, pp. x + 337). It is doubtless unnecessary for pupils to learn the technique of gas testing, but the teacher who is familiar with such works as this will without question be able to give clearer explanations of the vexing question of the gas meter.

The fuels of the household have been considered by Marian White (Boston: Whitcomb & Barrows, pp. 97) in a recently published volume which presents an interesting and valuable summary of available data.

HYGIENE IN THE HOME.

In preceding sections, articles have been cited which have to do with various questions of household hygiene. References to a number of additional articles are here grouped together, particularly those which have to do with dust in relation to comfort and health, and with soaps and other materials.

Clean air and clean streets are generally recognized as important from the standpoint of comfort and health. Many studies have been made which show the relation of such matters to the general subject of hygiene.

The dust problem has been considered in a paper by D. Layriz (Die Staubplage und ihre Bekämpfung. Munich, 1908; rev. in *Arch. Volkswohlfahrt*, 2, 1909, No. 6, p. 396) in which he considers the dust nuisance and ways of lessening it, with reference particularly to street dust.

At the German Department of Public Health, R. Heise (*Arb. a. d. Kais. Ges.-A*, 30, 1909, No. 1, p. 93; abs. in *Hyg. Rundschau*, 19, 1909, No. 23, p. 1365) studied 31 samples of materials recommended for the treatment of floors to prevent dust. The efficiency, cost, and other factors were taken into account as well as their composition.

A paper which is of interest in this connection is G. Orsi's (*Arch. Hyg.*, 68, 1908, No. 1, p. 10), which proposes a method for estimating quantitatively the amount of soot in air. His work was carried on at the Hygienic Institute of the University of Berlin under Rubner's direction. Orsi also studied the amount of dust in air and his investi-

gation contains much information regarding the character of dust, its effect on air, and the physical laws which govern the amount by air currents.

Dust almost inevitably implies bacteria associated with it. A new method for the bacteriological study of air is described by M. Ficker (*Arch. Hyg.*, 69, 1909, No. 1, p. 48), of the Hygienic Institute of the University of Berlin. Such work as this should be known to students of ventilation, as it is obvious that the whole question of ventilation must depend upon knowledge and not upon theory.

The injury which may result from the use of cosmetics and similar materials is a subject in which the teacher may have occasion to speak, and it is interesting to know that such materials are quite commonly analyzed in connection with pure food and drug work, so that reliable information is available regarding their composition and properties. As an example of such work may be cited Lürig's and Sartori's study (*Jahrb. Chem. Untersuch. Amt. Breslau*, 1908-9, p. 58; abs. in *Ztschr. Untersuch. Nahr. u. Genussmtl.*, 19, 1910, No. 8, p. 460) of the composition of hair dyes.

Pupils commonly receive instruction regarding the hygiene of the body, but it is not always easy to supply the scientific data which should be the foundation of such teaching. It is an easy matter to speak of the cleaning and disinfecting processes of soaps, mouth washes, etc., but much less easy to supply the chemical data which such subjects involve. The disinfecting action of ordinary tooth and mouth washes has been studied by R. Basseuge (*Deut. Med. Wchnschr.*, 35, 1909, No. 33, p. 1436; abs. in *Chem. Abs.*, 3, 1909, No. 22, p. 2711), and it is interesting to know that only two of the commercial products examined showed any bactericidal action.

CONCLUSION.

It would have been possible to extend greatly the list of references to papers similar in character to those included in the above summary, but the object was rather to make a preliminary survey of recent literature than to compile an exhaustive summary of data. It is hoped that libraries in colleges and schools will find it possible to increase their list of journals which are probable sources of information pertaining to domestic art topics and that systematic attempts may be made to abstract such literature. If a special section devoted to such subjects could be included in some one of the standard abstract journals, it would serve a very useful purpose.

A LESSON IN HOUSE CONSTRUCTION FOR THE ELEMENTARY GRADES.[1]

ETHEL FIFIELD BROOKS, A.B., S.B.

Architect.

Young as you are, I want you to think now nice it would be to build a house some day, and if you learn a little about it now you can be noticing how houses are being built as you pass them in your walks. We are going to take for granted that this house will be in the country or edge of town and that it will stand by itself with the light and air coming to it on all sides. This way of living will make your family so much more healthy and happy that it is worth planning for and giving up other things for all these years that you are growing up.

If we are so fortunate as to be able to build a house for ourselves, we must first ask how can a house be so built that it will be our very good friend and keep us always in good health, so far as a house can—and it can do a great deal more for us in that way than most of us realize. Can it give us, if we build it rightly, that which we need most of all to make us strong and well, sunshine and fresh air, and a great deal of both? And what can it refuse to give our enemies, the disease germs, that are always ready to attack us when we are not in the best of health? a dark, damp spot where they may grow and multiply.

So we see that our house must be sunny and airy and dry, and when we go out to choose a place on which to build it we must have those three things in mind.

Now, as to sunshine. If there are trees on the vacant lot which we look at which will shade our house too much we can have them cut down, so we will not refuse to buy the land for that reason; but if there are houses too near, or a hill which shuts off the sun, we can do nothing with them, so we will not buy, but look farther on.

As to fresh air, we shall use our eyes very sharply for anything that will send us bad air to breathe, a factory, perhaps, or a tall apart-

[1] Presented at the Boston Meeting of the Household Arts Section of the American Home Economics Association, July 5–6, 1910.

ment house, that will shut off our fresh air. We must be careful, too, to choose a spot that is sheltered from the wind that blows dust and germs into our noses, and into our mouths, too, if we do not keep them shut.

If we have found a sunny, airy place to build our house, we must next see whether it will be dry enough. You know there is a great deal of water in the earth; there may be hidden springs, and there is besides the water that falls from the sky. Some kinds of soil will keep the water in them, and some kinds will let it drain away. So we have borings made into the earth to find just what the soil is. If it is gravel, that is very good indeed, for gravel will let the moisture drain easily through it; sand is nearly as good as gravel, and loam is next best; rock is good but expensive, as it must be blasted away to make a cellar. If we find that the soil is clay we shall probably build our house in another place, for clay is very bad indeed to build upon; when clay gets wet it stays wet for a long time—you know what happens when you step in a mud-puddle: The mud gives way in every direction and lets your foot down with a splash. It is the same thing that happens on a large scale if we put a foundation-wall on a clay bank: The rain comes, the clay soaks it up, and splash! the clay skips away from under our wall and down comes the house. So we will not buy land that we find to be clay, neither will we buy what is called "made land;" as somebody in The Chippendales said, it may be made of "gravel, tomato-cans and old hoop-skirts;" it may be made of decayed garbage, too, and other things too unpleasant to think about; so we will not buy "made land."

While we have been hunting, however, we will suppose that we have found just the piece of land that we do want to buy, so we go to our architect and tell him exactly what kind of house we want. It must be a house that shall be sunny, airy and dry, as well as beautiful, and so planned as not to waste our time and energy by making us take more steps than necessary in doing the house-work. We tell him that we want our windows large enough to let in plenty of sunshine, and high enough to let out the hot, bad air that rises to the top of the rooms; the greater distance there is between the ceiling and the top of the windows, the more bad air will stay in the room, but if the window be high, and open at the top, all or nearly all of the bad air will escape. We tell the architect, too, to make all ceilings at least nine feet high, to give us good ventilation, and to allow at least 1000 cubic feet of air for each person who occupies a bed-room. That is,

if one person sleeps in a room, the room must be, say, ten feet long, ten wide and ten high; if two are to sleep there, the room must be twice as large. We shall also have in our house fireplaces and ventilating-flues to give us fresh air, and it is likely that we may have to insist upon some, if not all, of these points, for many people do not think of them when they build a house, and an architect may not understand that we want them if we do not insist pretty strongly.

In order to be sure of getting sunlight into every room in the house at some time of day, we can find in the Nautical Almanac the exact point of the compass where the sun rises and sets on the shortest as well as the longest day of the year; and after our house is planned it will be well to make a "sun-plan," too, for if we find that the sun does not between its rising and setting shine on one side of the house, as it had been arranged to stand, parallel to the street, by setting the house at a little different angle we can catch the sunshine on all sides.

When the architect has satisfied us with the plans of the house we will go on with its building. Our house as planned is not only to be healthful, but beautiful also, for many of us do not realize what a difference it makes to us if we have beautiful surroundings in our daily life. And supposing that our architect has made the house all that we wish it to be on paper, we have next to see that it is so built as to be what we wish it in reality, and as the first of its building is the most important, that is the part that we will watch most closely; for if our foundation-walls and cellar are not dry, neither can the house itself be dry; if foundation and cellar-floor are not damp-proof the dampness will creep through into the cellar, and as the cellar-air rises through the house, the air in the house can be little better than that in the cellar; while if the foundation-walls become damp, the walls of the house will be damp, too, as the moisture rises. So we make our walls as nearly damp-proof as we can, with a coating of asphalt on the outside to keep out moisture and a layer of slate or asphalt or water-proof paper in the wall itself to keep the dampness from rising into the walls of the house. We make our cellar-floor damp-proof by layers of concrete, asphalt and again concrete. It may be that we have found the soil to be full of moisture, and in that case before building either walls or floor we have first laid lines of tile drain-pipe to carry the moisture away, and even in a good soil we provide for carrying moisture away from outside the foundation-walls by having a ditch dug around them and a little deeper than they are, with drain-pipe at the bottom filled in with

broken stone, gravel and sand; this will carry away the ground-moisture and the rain-fall from the foundation-walls.

When the foundation is built, the walls of the house go up next, and these are of such material as suits our taste and our pocket-book. They may be brick, stone, concrete or wood. If we can afford it, we have our house built of fireproof material entirely, if not we see to it that the hollow places in walls and ceilings are so stopped that fire may not steal unseen from one story to another. And, by the way, these hollow spaces, containing air and acting as non-conductors, are a very good protection against heat in summer and cold in winter, besides keeping the house dryer than would a solid wall.

When it comes to plumbing, we can only say that we must have the best—it may be simple, in fact it must be simple. The material must be of the very best, and put up by the best plumber we know, and especially we must insist that every fixture, every sink and wash-tub and basin, every bath-tub and every water-closet shall have a separate trap to prevent the foul air from sewer and waste-pipes from rising into the house.

These are the main things we have to think about when building a house. If we are buying instead we try to find a house that is as nearly as possible like the one we would build if we could. We try to find one that is airy and dry and sunny in every room, with no porch-roofs to shut out all the sunshine from a room (a summer awning is better), and with a dry, sweet cellar. If the house suits us, we have the plumbing tested to see if the pipes are quite tight.

If we are looking for a boarding-place we choose a sunny room, we look into the kitchen to see if it is sunny, airy and clean, we go into the cellar to find out whether it is dry or not, and we sniff vigorously in the toilet-rooms to test the plumbing as much as the sense of smell can do it. For if there is a bad smell in the house, there must be a cause for it; if we can remove that cause, all well and good, if not, the quicker we get out the better for us. There is no friend more useful than a sensitive and well-trained nose. The railroads have a sign on grade-crossings, "Stop, look, listen." When we approach a crossing we act accordingly. Now, we can make a similar watchword for ourselves in choosing a living-place: is the cellar dry? are the traps in proper condition? is there a crack in a waste-pipe, a gas-pipe or fixture that leaks?—Stop, look, smell!

It is a great responsibility to build a house. If we are choosing a boarding-place we have only ourselves to think of, but in building we

have to think of our families, our children and perhaps our childrens' children. No pains can be too great, no caution too minute. A house can be the best of friends or it can be the most dangerous enemy, because its dangers are unseen and unsuspected—and here is the especial argument against buying a house rather than building for oneself. Drainage, plumbing, foundations—how do we know what they are? If we find out at heavy cost—and we are lucky if the cost is only in money and not in health or even human life—it will call for further expense to make right what was wrong. Contractors are trying people to deal with, so are architects and plumbers, by reputation; but after all, what is a little annoyance if we are sure we are getting just what we want, and if we are sure that what we want is right for us to have? Remember, it is not only the house, it is the home! What house could be a happy home for our children if it were also a nursery for disease? But sunshine, fresh air, sweet odors, fine proportions—how better can we start our home?

THE APPLICATIONS OF CEMENT IN RESIDENCE CONSTRUCTION.

JAMES M. WHITE.

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Concrete and stucco are not new constructive materials, but they have come into general use so recently that the usual effects obtained with them may be more appropriately described as novel, rather than artistic. The constructive value of a material is far more quickly appreciated than its artistic possibilities, and though there is ample proof of the durability of concrete there are only occasional evidences of a true appreciation of the logical treatment for it and of the ways by which color effects may be successfully introduced.

An entire house may be built of concrete, but this article is to deal with outside walls only and they are usually built in one of the following ways: Monolithic concrete, which may be made either with or without an air space in the wall; monolithic concrete, with a hollow tile inside lining; monolithic concrete, with a hollow tile outside facing; concrete blocks; brick or hollow tile walls, with stucco exteriors; and frame buildings, with stucco exteriors, using either wood or metal lath.

The essentials of a perfect wall are strength, dryness and beauty. There is no doubt about concrete complying with the first of these requisites, but experience has proved that, unless employed very skillfully, neither concrete nor stucco will make a non-absorbent wall. In some climates protection need be provided only against dampness which comes from the ground, or from the exterior, while in other places—because of the high humidity which prevails during certain periods of the summer—it is necessary to construct a wall so that the interior surface will change in temperature almost as rapidly as the temperature of the room, to prevent the moisture of the atmosphere from condensing upon it.

A monolithic concrete wall, if mixed very wet, with one part of cement to six parts of sand and stone of suitable sizes, will be much more nearly waterproof than any other form of masonry construc-

tion. The same density of material cannot be secured with stucco, unless the surface is thoroughly troweled; but there is nothing artistic in a troweled finish and it should never be employed for residence walls above grade.

The advocates of cement exteriors for houses have laid great stress upon the economy of maintenance because of its being unnecessary to do any painting. This claim is justified in part, but my experience convinces me that painting at the outset is very essential to the proper preservation of most stucco surfaces, and that it is beneficial in all cases. Special cement paints should be used, and not the ordinary lead and oil; and it is not necessary to keep on painting as with wood surfaces.

Briefly summarized, the advantages and disadvantages of the different methods of construction are as follows: The monolithic concrete wall must receive some special treatment after the forms are removed. This may be very effectively done in several ways. The simplest method is to remove the forms as soon as possible and then to scrub the surface with a block of wood. This merely removes the form marks and makes the surface of a uniform texture, but does not give an artistic wall unless special precautions have been taken in choosing the materials which will appear on the surface when the fine particles of cement are removed.

With very little additional trouble a better effect can be obtained by the following method: As soon as it can be done without removing the coarser particles, the surface should be brushed with an ordinary scrubbing brush, with stiff palmetto fibers, or one with wire bristles. Two or three days after the brushing the surface should be washed down with a dilute acid solution, using one part of commercial muriatic acid to two or three parts of water. This solution may be applied with any kind of a brush, and while still wet, the surface should be thoroughly rubbed with a stiff vegetable fiber brush. The solution should not be allowed to remain upon the wall more than half an hour, and must be thoroughly washed off with clean water to avoid leaving a streaked or mottled appearance. If the surface cannot be treated until after it has become hard, a very effective finish can be obtained by pounding it all over with a stone mason's bush hammer. The effect shown in figure VI may be obtained by plastering the inside of the forms with clay and imbedding pebbles in it. After the forms are removed, the clay is easily washed off, leaving the pebbles fully exposed.

If the monolithic wall is made hollow, the inside plaster can be applied directly to the wall; but the concrete must be left quite rough or the plaster will not adhere firmly. The use of a hollow tile lining for walls is to be recommended, in which case the hollow tile is laid up against the inside of the forms, and the concrete poured in behind it, which binds the whole mass together. This makes a splendid wall construction. The exterior should be treated with acid or bush hammered, for stucco cannot be successfully applied to a smooth concrete surface.

The use of tile on the outside of the wall protects the concrete from the heat of the sun, and thereby maintains a more nearly uniform temperature on the interior, since the concrete wall changes temperature very slowly. The use of tile on the outside also gives an excellent opportunity for applying a stucco of any desired color or surface texture.

The concrete block walls have been more extensively used than any others, because the walls can be laid up the same as masonry walls. Good concrete blocks can be made, but they are the exception; and it is almost impossible to design a wall to be built of blocks which will have the necessary variety to make it attractive. The blocks are not readily changed in size, and a rigidity of design results which is usually extremely monotonous.

In many localities there is good clay but very little sand or stone. In such cases brick is a more economical building material for the body of the wall than concrete. The artistic effects of cement exteriors may be obtained in this case by applying stucco. If the wall is built hollow, or is to be furred on the inside, the stucco may be applied directly to the brick surfaces; but if the wall is solid, it is advisable to coat it both on the outside and inside with one of the waterproofing compounds made for the purpose, which will prevent moisture entering the wall from outside, and avoid the staining of the plaster inside, without interfering at all with its bonding to the wall. The objection to tile walls, which are to be built of but a single thickness of tile, is that it is difficult to fill the end joints with mortar. If more than one tile is used in the thickness of the wall, this objection is obviated. The waterproofing coatings can often be used to advantage on the inside of concrete walls to prevent plaster stains.

Stucco on frame construction has been more generally employed than any of the other forms of cement finish. With this construction it is very necessary to secure an impervious coating, because the

freezing and thawing of so thin a layer will destroy it; and the moisture will also corrode the metal lath, which is never fully imbedded in the cement. Even if lath is painted or galvanized, it will in time be rusted out. Wood lath, one inch wide, may be successfully used, if the nailings are not over twelve inches apart.

The "rough cast" finish, which resembles figures IV and V, is the most durable, because the finer particles of cement are washed over the surface by the excess of water, which gives much the same finish that would be secured by brushing it over with a cement wash. Too rapid drying will surely cause cracks; and walls should be frequently sprinkled until well hardened. Such a surface may be tested for porosity by throwing water against it and noting whether it changes color, which is a sure indication that the surface has absorbed some of the moisture. Painting is the only possible protection for such a surface.

The mission buildings of California have furnished many suggestions for the design of concrete buildings; but it is always unwise to transplant any style, without carefully considering its adaptability to existing climatic conditions. In the middle and eastern states where there are open winters, resulting in intermittent freezing and thawing, and frequent rain falls at all seasons of the year, it is unwise to ever employ outside stucco work without protecting it by a heavily overhanging roof.

Frame houses often have many constructive defects which result in the buckling and breaking off of the stucco coating. All lumber employed for building purposes is more or less unseasoned, and if the studdings in the outside walls are not continuous throughout the entire height of the building, there is apt to be enough shrinkage at the floor levels to cause the breaking of the stucco. In remodeling old frame houses, of course this difficulty would not occur; and the simplicity of the lines of many an old house would make it very effective in stucco. Even with new lumber much of the difficulty mentioned may be obviated by using a wood belt course at the floor level, so as to break the stucco surface, though this usually makes it desirable to employ a half-timber effect for the walls above that line. Such a treatment is almost always the most attractive, but great care is required to prevent the dampness getting behind the woodwork. Stained woodwork is much more effective with a cement exterior than painted woodwork, but the stain is not as efficient a preservative.

There are given herewith six photographic reproductions of brushed

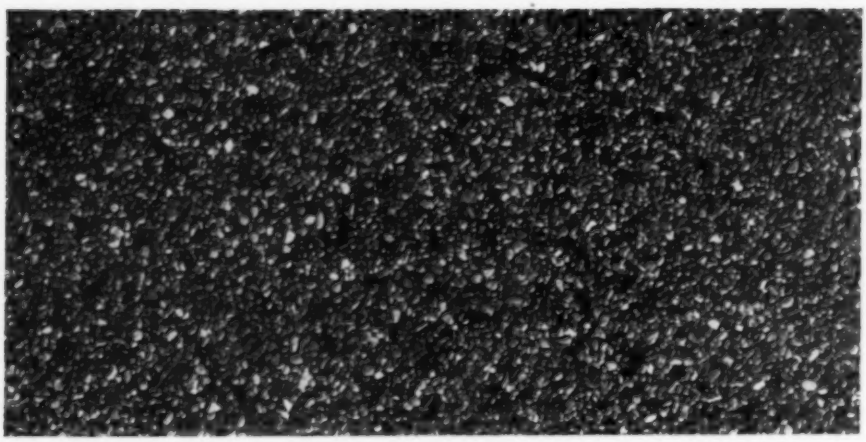

Figure I—Cement and fine sand 1 : 3.

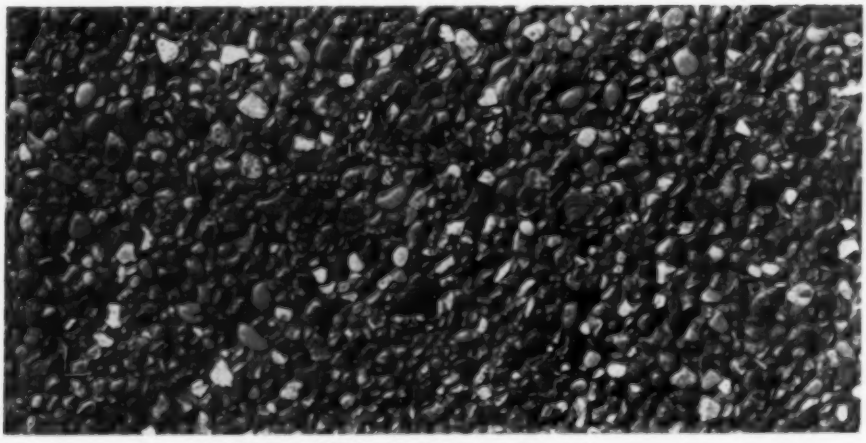

Figure II—Cement and coarse sand 1 : 3.

Figure III—Cement and ¼ in. to ½ in. pebbles 1 : 3.

Surfaces reduced one-half of originals.

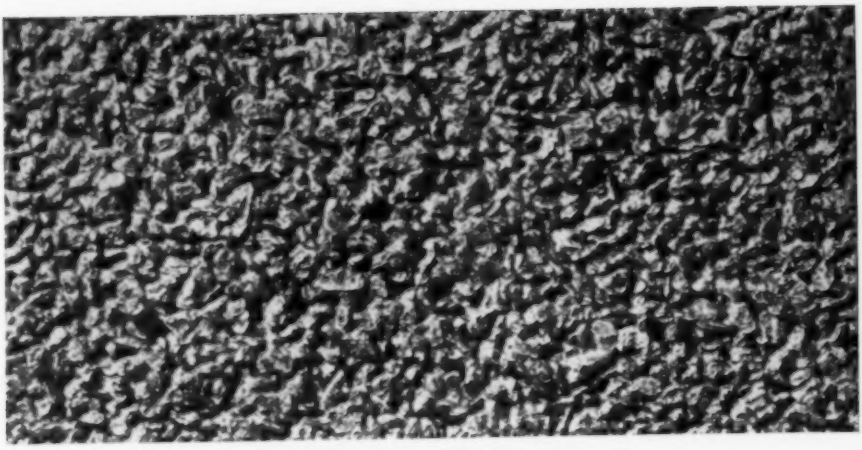

Figure IV—Cement and red granite screenings 1 : 2½.

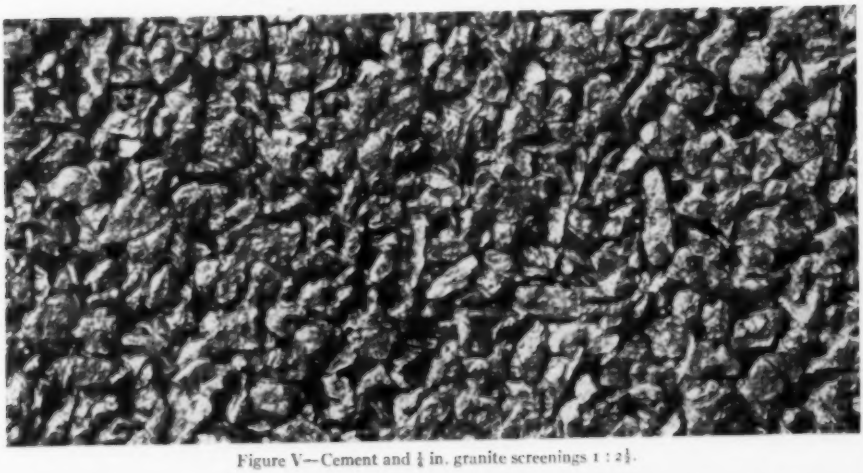

Figure V—Cement and ¼ in. granite screenings 1 : 2½.

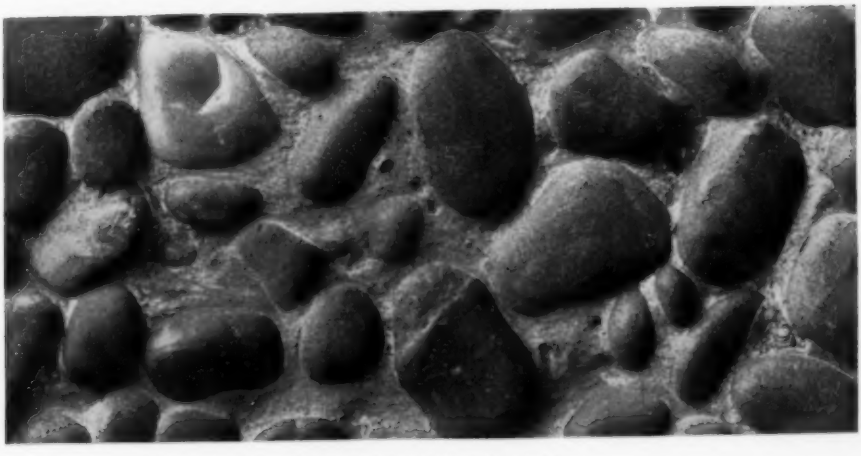

Figure VI—Cement and black pebbles 1 : 2½.

Reproductions are actual size.

concrete surfaces produced in the laboratory of the Universal Portland Cement Company. The difference between these surfaces and that of ordinary gravel concrete is very striking, yet they are all practical, commercial finishes, and can be obtained by the use of material from an ordinary gravel bank. Figure I shows a comparatively fine, even-grained surface, composed of one part cement and three parts of fine sand, all of which passed a No. 8 and was retained upon a No. 50 mesh screen. Figure II is very much like Figure I in general appearance and color, but of a rougher, more uneven texture. This surface is a 1:3 mixture, with coarse sand, passing through a No. 4 and retained on a No. 8 screen. Figure III represents a finish made from a 1:3 mixture of cement, and from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. pebbles. Thus these surfaces are identical in every respect, except as to size of aggregate. The three surface finishes were all produced by the same method of treatment.

Figure IV shows a decidedly pleasing, even-grained surface composed of one part cement and two and one-half parts red granite screenings, all of which passed a No. 8 and was retained on a No. 16 sieve. Figure V is a reproduction of a surface composed of one part cement to two and one-half parts ordinary, quarter-inch, granite screenings, the material passing a No. 8 sieve being rejected. Both these surfaces are quite similar in every respect except in texture, that represented by Figure V being of a rougher, coarser grained texture than the other. As the cement is barely perceptible on these surfaces both look very much like rough, undressed red granite, the color being practically the same as that of the screenings of which they were made. Figure VI represents a treated surface composed of one part cement to two and one-half parts of black pebbles, varying in size from those retained on a No. 10 sieve to those passing a $1\frac{1}{4}$ inch mesh. The cut gives but a poor idea of the pleasing contrast between the light colored cement background and the black pebbles which stand out in bold relief from the surface.

There is no doubt but that cement architecture has come to stay; but there is still much to be learned about the limitations of the material and the importance of extreme care in the workmanship.

EDITORIALS.

The Meeting of the American Association for Study and Prevention of Infant Mortality.

The city of Baltimore with its good record for holding the first Tuberculosis Conference and Exhibit in this country and the first conference and exhibit in the interest of clean milk has to its credit the initiation of another important movement. From November 9–11 was held in that city the first conference for the Study and Prevention of Infant Mortality.

It was a notable occasion, addresses being delivered by many well recognized authorities on hygiene and pediatrics and by younger men and women whose work in these lines will be no less well known in the future. A remarkably well chosen and well mounted exhibit in the corridors of McCoy Hall of the Johns Hopkins University was open to the public for a week and it enforced by ocular demonstration the statements made by the lecturers.

That it is high time to start a crusade of this kind was evidenced by the startling character of the statistics brought out: That out of 100 children born alive 13 die; that the mortality for all ages from tuberculosis of the lungs is 50 per cent less than the mortality from all causes among infants; that of the 300,000 children who die yearly in this country fully one-half or 150,000 need not die; these being moderate estimates drawn from a restricted area, since statistics of birth are shamefully neglected in most of our municipalities.

Who is to solve this great problem? In the words of Dr. Wilbur C. Phillips, secretary of the New York Milk Commission,

> In the last analysis, infant mortality is to be solved, not by philanthropy or by institutions, or by the medical profession, or by the state, but by intelligent motherhood.

And around the present and future motherhood of the country a cordon, as it were, is to be drawn; the doctor, the nurse, the milk depot, the hospital, the school, the visiting dietitian are all uniting to train the girl and the young mother and to follow the infant through every week of its early life. The time has evidently gone by for

parents to assume that the rearing of their children belongs exclusively to them. If they do not know their business, or knowing, do not perform it, the community must step in. It has too much at stake; these infants are to be citizens, either able to carry their share of the burdens or to be a dead weight upon the able bodied.

Throughout the meetings there was evident what might be called a feeling of insurgency, of revolt, against the meager share now given in systems of education to all that makes for the conservation of life and health and the development of efficiency in the individual. It was charged that medical schools give insufficient time to training in preventive medicine and hygiene and to pediatrics, the study of infant life; also that instruction in normal schools is far behind modern requirements, "ninety-three per cent of their questions in physiology and hygiene being in anatomy and less than 7 per cent on healthful living."

During the conference the importance of breast feeding in reducing infant mortality, the urgent need of uniform state laws for compelling birth registration, the necessary courses of instruction for all ages and both sexes, were all dwelt on in the most convincing manner.

Among the most encouraging reports of a new activity in the teaching of hygiene were those made at the session for education in which Home Economics played a large part. This section was in charge of Dr. Helen C. Putnam, and addresses were made by women whose names are very familiar to our readers, as Prof. Abby L. Marlatt of the University of Wisconsin and Prof. Flora Rose of Cornell University.

The aims of the new association are of special interest to the readers of this JOURNAL. To keep alive the babies, and to rear them to effective citizenship—is not this one of the chief ends for which the home exists?

The Association and The Journal.

With this number ends the second volume of THE JOURNAL OF HOME ECONOMICS. Being a baby has recently been classed among the extra hazardous occupations, and the friends of this new movement may be devoutly thankful that the various diseases that lie in wait for infancy have not carried off this promising offspring of our Association. Its heredity being of the best, its constitution has proved vigorous, and means for its development have been generously furnished by its sponsors. Those of us appointed to watch

over it have received some useful training at the expense of the Association and the account of our stewardship will be presented at the annual meeting, but to that larger audience which is made up of the readers of the JOURNAL we wish to present the following statements.

The correspondence that has come in from our widely scattered members has shown that the idea of the Association has taken firm root. It has become a name to conjure with; it stands for a union of like-minded people joined together to further the interests and raise the standards of the home, and they have found themselves able to do together what is impossible to the individual.

To foster this spirit of loyalty to the Association has been our main object. To this end we have placed the emphasis not on subscriptions to the JOURNAL but on membership in the Association, the JOURNAL being one of the privileges of membership, for we have felt sure that a firmly knit association devoted to noble ends would be of untold good to its members and to the community.

We hope that this loyalty to the Association will be unaffected by the slight changes in its relation to the JOURNAL which are now made necessary by regulations recently put in force by the Post-Office Department, among which is the requirement that the subscription list to a periodical which carries advertisements must be separate and distinct from the membership of an Association.

A full account of this new arrangement was set forth in the extra slip bound in with the November issue, and subscriptions to the *Journal* for 1911 were asked for in accordance with the prescribed form. This appeal has met with a generons response but we find it necessary to reprint it with this issue that it may meet the eye of any who failed to see it before.

The price of membership has been placed at a nominal figure, 25 cents, with the view of putting no hindrance in the way of building up a large organization. If the 1500 members now on our lists all pay this fee the sum realized will defray the expenses of the annual meeting, printing of necessary notices, etc. To increase our membership and to bring new subscribers to the JOURNAL should be a work dear to the heart of every one of us.

Please note that the JOURNAL cannot be mailed to anyone who is in arrears for subscription. Note also that the priceof single copies has been raised to fifty cents.

NOTICES.

Title Page and Index. Members will please note that the title page and index for Volume II, 1910, are added to this number. Also that the title page for Volume I, 1909, has now been printed separately and will be mailed to all who request it for binding.

Back Numbers. The editors repeat their request for Nos. I and II of Volume I and No. I of Volume II. Forty cents will be paid for each number in cash or in credit on subscription.

Reprints. In ordering reprints members will please consult the cover page of the latest issue, as changes and additions are frequently made.

Convention and Annual Meeting. The convention of the American Home Economics Association will be held in Teachers College, St. Louis, December 27-30. The annual meeting will be on Thursday, December 29, at 1.30 p.m. The provisonal program has been sent to all members and the final program, which will be printed just before the Convention meets, will be sent to all requesting it.

BENJAMIN R. ANDREWS, *Secretary*,

525 West 120th St., New York City.

November 30, 1910.

NEWS FROM THE FIELD.

University of Illinois.

The department of household science reports an increased enrollment. In Miss Bevier's course on The House, alone, there are 118 students, representing eleven states.

The 1910 high school conference was held at the university November 17–19th, with the following topics: What can the course in elementary science do for the domestic science teacher? Possibilities in chemistry being discussed by A. C. Norris, of the Rockford High School, and those in physiology and bacteriology by Mr. Bonnell, of the Harrisburg High School; household science as related to other work in the university, by Professor Hollister, high school visitor of the university; examples of art needed in the teaching of clothing and the home, by G. A. Eggers, Chicago Normal School; under the general subject of clothing, what to teach the high school girl and when to teach it, by Miss Peterson, Peoria High School; how to teach it, by Mrs. Helen Brooks, Illinois Normal University; and clothing and hygiene by Mildred Wiegley, DeKalb High School; and practical lessons to improve the sanitary artistic and economic conditions of the homes, the sanitary aspects being considered by Miss Edith Hall, DeKalb Normal School, the artistic side by Miss Melissa Wilson, New Trier High School, Kenilworth, and the economic phases by Miss Margaret Culberston of Hinsdale.

The conference grows in interest and importance each year. The fruit of the work of the high school assistant is seen in the rapid increase of the number of schools offering household science, there now being 71 as against 21 three years since. The committee in charge of the syllabus for the high school work, which serves to unify and in a measure standardize this instruction, has completed a revision of the syllabus which was discussed at the meeting.

In connection with the college of agriculture the household science department is establishing movable schools, in which two representatives of the department work for a week, giving demonstrations and lectures on food, clothing and the home.

Some further results of Dr. Goldthwaite's research work on jelly appeared in the November number of the *Journal of Engineering and Industrial Chemistry*. The department is also publishing a series of five bulletins by which the results of investigations of the department will be made available to the housekeepers of the state.

The School of Household Arts, Teachers College.

The school of household arts opened for the academic year with a much larger registration than that of the preceding year. Last year there were approximately, 260 college students in the school, candidates for diplomas and degrees, 77 taking domestic art; domestic science, 152; hospital economics, 17; household administration, 15, and house decoration, 1. On October 5, 1910, there were already registered some 335 students, divided as follows: Domestic art, 59; domestic science, 223; nursing and health, 25; household administration and dietetics, 17; and house decoration, 11. The registration has subsequently increased in all the divisions.

In addition to the regular students registered in the school last year, there were in the "special classes" in household arts some 400 students who came for one or more days a week for the practical classes in cooking, design decoration and management. The special class registration for the current year is not yet complete but there is the prospect of increased registration in these classes as well as in the regular college work.

An interesting factor this year is the registration of a group of high school graduates for the applied arts diploma. The group already numbers some 25. Though classified along with the non-matriculated students of the college they form an important group, since they are planning for a definite two-year curriculum of study, at the end of which many of them will doubtless transfer into the curricula leading to the professional diplomas in teaching, administration, and decoration.

The experiment of a Journal Club is being tried this year. The plan is to have a student organization,the members of which bring in abstracts of magazine articles and reviews of new books. The club meets once a month and promises to be of help to the students. Occasional lectures are to be a feature.

Another series of meetings which has been found useful is the monthly lecture by visiting speakers upon opportunities for work in the newer branches of household arts work. Addresses upon trade schools, journalism, extension work and other newer forms of activity were included in last year's series of addresses. Lectures are being repeated this year with the additional provision, during the second half-year, of a series of informal addresses by members of the faculty upon new subject-matter in the field of household arts instruction. In these addresses recent progress in nutrition, textiles, decoration and other divisions of the field will be presented.

University of Wisconsin.

The number of girls enrolled in the department of Home Economics of the college of agriculture of the university is more than double that of last year. Over 100 young women are taking the four years' and graduate courses. A large number of students in the college of letters and science, candidates for the bachelor of arts degree, have also elected the general survey of Home Economics and the art and design studies, open to students in that college. In the latter subject one class includes over 100 young women. Most of those who have entered this year have had good preparation and are in position to receive the maximum benefits from the instruction.

Scranton, Pa. Y. W. C. A.

Miss Edna Miller, of Montrose, Pa., a 1910 graduate in domestic science at Pratt Institute, has been made director of domestic science and arts of the Y. W.C.A. of Scranton. Miss Miller is holding a cooking class every night, and on one afternoon in the week a sewing class for children which she conducts in a novel way. From 3–4 p.m. she teaches a class of volunteer teachers and from 4–5 p.m. these teachers teach the children under her direction. The first day 65 children appeared, and it is hoped to have 100.

Battersea Polytechnic Institute.

According to a recent note in *Nature*, the governing body of the Battersea (England) Polytechnic is arranging for considerable development in the work of the domestic economy department. An entirely new third-year course will be introduced, which is expected to carry forward greatly the application of science to housecraft. It will consist, in the main, of much more elaborate work both on the theoretical and practical sides in the subjects of physiology, hygiene, chemistry, physics, and biology. Special attention is to be given to the scientific side of the processes which underlie the arts of cookery, laundrywork, and housewifery. It is also intended that students shall spend some of their time in practical research work upon the various biological and chemical processes in which so much of their work will be done.

Miss Ravenhill in America.

Miss Alice Ravenhill, author of the invaluable study of the American institutions teaching domestic science which appeared in special reports of the English Board of Education some years ago, and known as the leader of the Home Economics movement in England, is retiring from active educational work and will make her home for the future in British Columbia. Miss Ravenhill's many American friends will be glad to have her new address: Chrachveattle, Shawnigan Lake, P. O., Vancouver Island, B. C., Canada.

New York State Branch of the Association.

This branch was organized in Boston, in December, 1909, but will hold its first meeting Dec. 28, in connection with the state teachers' association at Rochester. A largely attended meeting is hoped for. There is a membership fee of twenty-five cents, of which fifteen cents may be retained by local branches for their work. Such a branch was formed at Rochester last June, with local officers, and branches may be formed in other parts of the state, with the coöperation of the state officers if desired.

Ohio Chapter of the Association.

The first annual meeting took place at Dayton, November 11. The program included an address by President W. O. Thompson of Ohio State University on The Place of Domestic Science in Secondary and College Education; a luncheon at the Stivers Manual Training High School, and a round table led by Miss Rachel Hartshorn Colwell. Among the the topics discussed were The Use of Drafting in High Schools, by Miss Lana Bishop, Technical High School, Cleveland; the Relation of Domestic Art in the Elementary Schools to that in the High School; and Plans for School Kitchens and Materials for Tops of Tables, by Miss Ruth A. Wardall, Domestic Science Department, Ohio State University, and Miss Uhlrick, Supervisor of Household Arts, Cincinnati.

Wisconsin Branch Association.

The Wisconsin branch was formed at Milwaukee, Wis., at the meeting of the Wisconsin State Teachers' Association last year, with Miss Emma Conley, School of Agriculture, Wausau, Chairman, and Miss Abby L. Marlatt of the University of Wisconsin, Mrs. Bertha Johnston, director of domestic sciences, Oskkosh, and Miss A. Bischoff, director of domestic science, Ashland, as members of the executive committee.

The first annual meeting was held at Milwaukee, Nov., 5 1910,

in conjunction with the domestic science section of the state teachers' association. Miss Mary S. Snow, director of household arts, Chicago, gave a paper on the Training of Girls for Efficiency. Miss Marlatt led a round table discussion on the aim and purpose of the branch association.

Home Economics in Women's Clubs.

In several large cities women's clubs are arranging for courses of popular lectures on Home Economics subjects. Much of this interest has been aroused during the past two years by the efficient work of Mrs. Olaf B. Guldlin, of Fort Wayne, Indiana, the chairman of the Home Economics Committee of the General Federation of Women's Clubs. It has proved a wise policy to hold her in that office for a second term instead of starting with a wholly new committee as has been the plan heretofore. The new committee in full consists of Mrs Guldlin, chairman; Miss Mary F. Rausch, State Agr. College, Fort Collins, Col., vice-chairman, Miss Caroline L. Hunt, Madison, Wis.; Miss Martha Van Rensselaer, Agr. College, Ithaca, New York; Miss Anna Barrows, Teachers College, New York City; Mrs. Chas. P. Weaver, Louisville, Ky.; Mrs. Cree T. Work, Denton, Texas; Mrs. H. M. Pancoast, Palmyra, N. J.; Mrs. C. R. Wyatt, Huntington, W. Va.; and Mrs. Ray Ruchton, Montgomery, Ala.

Home Economics had an important place in the program of the recent Indiana State Federation meeting. Mrs. Virginia C. Meredith, who has been for so long identified with the work, presided at this session. The Field and Its Possibilities was very enthusiastically presented by Mrs. Guldlin, and a plea for a closer relation between the work in the home and Home Economics in the school was made by Miss Isabel Bevier of the University of Illinois, under the title Home Economics and The Home.

Home Economics in Farmers' Institutes, etc.

There is an increasing demand for simple practical talks and demonstration lectures on household topics before farmers' institutes. North Dakota, Iowa and West Virginia are arranging for special work of this type, and several other states will send household economics workers with their agricultural trains. Miss Abby L. Marlatt is arranging a full program for the short course in Home Economics at the University of Wisconsin.

The New England Corn Exposition, held at Worcester, Mass., November 7th–12th, recognized its connection with Home Economics by introducing several lectures on Corn as Human Food.

The Brooklyn Institute of Arts and Sciences in its prospectus for 1910–1911 announces two courses of lectures on domestic science on the following topics: November 10, All Sorts and Conditions of Kitchens; November 17, The Grocery Bill; December 1, Food for a Day; December 8, Food for the Growing Child; December 15, Dinner; December 22, Milk and Eggs; January 6, The Fireless Cooker and its Use; January 13, How to Use the Casserole; January 20, Electrical Cooking Devices; January 27, Milk, Butter and Cheese; and February 3, Modern Labor-Saving Devices. All of these lectures are to be illustrated by cookery or with lantern slides.

Philadelphia League of Home and School Associations.

The third annual conference of the Philadelphia League of Home and School Associations occurred October 27–29, 1910, the sessions being held at the office of the superintendent of schools, the William Penn High School, and the New Century Club.

At the afternoon session on October 28 the topics discussed were: What the City Owes the Child, What the Citizen Owes the Child, and What the Child Owes the City, the speakers being Hon. John E. Reyburn, Mayor of Philadelphia, Miss Marion Reilly, Dean of Bryn Mawr College, and Rabbi Joseph Krauskopf, President Patriotic Society of Philadelphia. The subject under consideration at the morning session, October 29, was Home, School, and the Budget, the speakers being Miss Pattie S. Hill, Teachers College, as to the home; Superintendent John W. Carr, of Bayonne, N. J., and Hon. O. T. Carson, of Columbus, Ohio, as to the school; Mrs. Louise Stevens Bryant, Russell Sage Foundation, New York City, as to luncheons, and Dr. William H. Allen, Bureau of Municipal Research, New York City, as to the city's budget. At the afternoon session reports of the association were presented, and also a report by Mrs. J. Scott Anderson, delegate from the Home and School League, on the International Congress of Home Education held at Brussels, Belgium, August, 1910.

It is interesting to note in this connection that the school luncheon work under Miss Emma Smedley's supervision is being very rapidly extended in the city.

A German Household Association.

The interests of German housewifery are about to be furthered by a German Household Association, organized on a basis similar to that of the German Agricultural Society. This association purposes to include within the scope of its activities all matters relating to domestic economy, not only the hygienic and technical phases, but the educational, national, and ethical aspects of the subject. As announced in the prospectus, some special matters for consideration are as follows: Schools for mistresses, maids, cooks and housekeepers; instruction in cookery and housewifery in boarding schools, high schools, training schools, etc.; training courses for domestic science teachers; instruction in housewifery in the home; Home Economics conferences; household accounts—the relation of income to expenditure, etc.; and experiment stations for the testing of household supplies, implements and machines.

Various means to be employed by the association to further its aims include the establishment of a correspondence department, composed of competent judges and experts, to which all pertinent questions may be referred; a publication department, for the publication of a household year book, and the maintenance of housewifery departments in newspapers and magazines; the establishment of depots for the testing of household supplies in the interests of pure food, and of household implements, to promote domestic efficiency through a knowledge of labor-saving machinery; and the exhibition in international expositions, museums, schools and elsewhere, of approved machinery in operation, tested household necessities, and all other phases of housewifery which may be of educational value.—ELLEN BEERS, Teachers College

Child Welfare Exhibit in New York City.

This exhibit, which has been postponed till January, 1911, is being organized in a very comprehensive way. Committees have been appointed on homes, streets, schools, recreation and amusement, printed matter, industry, religious influences, settlement associations, public and private charities, and laws and administration. These committees will have in mind the effect of the respective forces on the health of the child, his mental development, his vocational adjustment, his recreational life, civic responsibilities, domestic and parental efficiency, character, and spiritual development. The exhibit will be made as graphic as possible by actual models, photographs, pictures, pictoral diagrams, cartoons, epigrams, etc., in addition to statistical tables, diagrams, charts and maps.

Readers of the JOURNAL will be especially interested in the plans of the committee on homes. Under the general head of housing and home life, there will be arranged an investigation and exhibit of about seven representative blocks, typical of differences in congestion of population, economic status, social condition and nationality. There will also be a constructive and contributory exhibit of models illustrating urban and rural possibilities in housing, models as to house furnishings, clothing for children, toys, sanitation, infant mortality, and the food and feeding of children. Under this last heading there will be presented typical menus, suggestions as to dietaries, comparative food values, school children's luncheons, the milk supply and the care of milk in the home, the ice supply in relation to the small consumer, and the inspection of bakeries, water tanks, drinking fountains, candy manufacture, soda fountains, and push-cart lunches and candies. There is also a section on home training, which includes a survey of present opportunities in New York City in public and private schools, settlements, societies, vocational schools, etc., the courses offered in cooking, needlecraft, bacteriology, biology, hygiene, household management, household art, child study and training, family and social life, etc., and suggestions for additional work along these lines.

In conjunction with the exhibit, the Home Economics Association of Greater New York will hold a meeting at which Dr. Lafayette B. Mendel, of the Sheffield Scientific School, will give an address on some phases of nutrition during growth.

School Lunch Problems.

A conference on the School Lunch Problem was held in Boston, Saturday, December 3, 1910. Among the speakers were Mrs. Ellen H. Richards, Miss Caroline L. Hunt, Dr. Thomas F. Harrington, Dr. George S. C. Badger, Mr. Robert A. Woods and Miss Sarah Louise Arnold.

Honor for Mrs. Richards.

At the celebration of the 25th anniversary of the founding of Smith College, Mrs. Ellen H. Richards, president of the American Home Economics Association, was honored with the degree of Bachelor of Science.

BOOKS AND LITERATURE.

Household Foes for Boys and Girls. Alice Ravenhill. (With a hundred illustrations by Agnes M. Kelley.) Sidgwick and Jackson, London, 1910. 359 pages.

This book by the leader of the Home Economics movement in England is intended "to arouse the interest of young people in the practice of daily domestic cleanliness and to furnish them with reasons, adapted to the comprehension of boys and girls, for the demands thus made upon their perseverance and energy." The book is written in the form of a story of the experiences of two children, who, with their mother, visit a dilapidated house and institute measures to set it in order. It endeavors to bring home the lessons of sanitation and cleanness upon a level of explanation intelligible to boys and girls. In each chapter there are references to literature, Miss Ravenhill's Practical Hygiene in particular, and other books as well.

An elementary school supervisor has examined the book and reports that like most works of this sort which attempt to be didactic the style is not entertaining, and that the children seem to know more of science than could be expected of the American child, at least. One would like to see the book tried out in a school room, however, before accepting the fairness of this criticism. The information which the book gives, the stimulus which it would afford to the forming of good habits, cannot be gainsaid. The illustrations are many of them wonderfully suited to their purpose and probably upon children would leave even a more lasting impression than the text.

A word should be said as to the type of book which this volume represents. It might well be considered a "supplementary reader," as the term is used in American schools. There is a great need to-day for suitable reading books on Home Economics for the use of young people. We are not sure but that Miss Ravenhill's Household Foes could be used with great advantage in American schools despite its constant references to English conditions. We hope it may inspire similar American books. —B. R. Andrews.

The Health of the City. Hollis Godfrey. Houghton Mifflin Company, Boston, 1910. Pp. 371. Price $1.25.

This is a popular and very interesting presentation of the problems of public sanitation. The chapters are devoted to the following: Air, the milk supply, the city's food, the food of the individual, city water and city waste, ice, sewer gas and plumbing, the city's noise, city housing abroad, and city housing in America. There follows a selected bibliography. The material presented in this volume first appeared in abbreviated form in the *Atlantic Monthly*, where it found many interested readers.

The Woman who Spends. Bertha J. Richardson. Whitcomb and Barrows, Boston. Pp. 161. $1.00 net.

This second edition of The Woman Who Spends is not a reprinting but a revision, and it is receiving a cordial welcome, we are told by the publishers, as a general statement of the economic function of woman as a house manager. The new edition contains a chapter on household accounts. This is a general statement of their importance and makes the new point that household accounts are worth while even if they are not absolutely correct, since, if they cover three-quarters or five-sixths of the whole expenditure they furnish something of a guide in household expenditure.

Choosing a Vocation. Frank Parsons. Houghton Mifflin Company, Boston, 1909. Pp. 165. $1.00.

The choice of a vocation is related to Home Economics, since the home is often the deciding influence in the choice of a trade or calling, and since the profession chosen is so closely related to the later income of the individual upon which the stability and success of the family often depend. Here, now, is the first attempt to place choice of vocation upon a solid basis of thorough self-examination by the individual, complete classified knowledge of the facts of different vocations, and expert assistance from trained vocation counselors. The author was the founder of the recently established Vocation Bureau in Boston, and also developed a professional method of work for the vocation counselor (which this book presents), and established a School for Vocation Counselors in Boston. This movement to aid young people in choosing a trade or calling is getting a foothold in the public schools, as in the Vocation Bureau of the New York City schools. See, also, an article on Vocation Teaching by W. T. Miller, in the *Atlantic Monthly* for November, 1909 (pp. 644–6).

Industrial History of the United States. Katherine Coman. Macmillan Company, 1910. Pp. 461. $1.60.

This is a new edition of this standard work by the professor of economics and sociology in Wellesley College. It will be of interest in all college departments of Home Economics as a standard textbook and reference work. To those who do not already know, it may be interesting to state that the general scheme of the book includes treatment of the following topics: The land and the people, the business aspects of colonization, industrial development under British control, industrial aspects of the revolution, national beginnings, industrial consequences of the War of 1812, the epoch of expansion and the crisis of 1837, territorial expansion and the revenue tariffs, the Civil War—economic causes and results, contemporary problems, and conservation.

The book contains 77 illustrations, including half-tones and maps.

Progress in Agricultural Education Extension. John Hamilton. U. S. Department of Agriculture, Office of Experiment Stations, Circular 98, pp. 12.

This report by Professor Hamilton, the Farmers' Institute specialist of the Office of Experiment Stations, will be found of a great deal of value to all interested in collegiate departments of Home Economics. The agricultural colleges have already done considerable work in Home Economics, references to which are made in this pamphlet, but it will be especially helpful in its statement of extension work in

agriculture. It is evident that useful extension work in Home Economics must follow along much the same lines.

National Education Association. Report of the Committee on The Place of Industries in Public Education to the National Council of Education, July, 1910. Published by the Association, 1910. Pp. 123.

This is the latest summary of the vocational education situation. It includes the reportof sub-committees on industries in the elementary schools, intermediate schools, industrial and technical education in the secondary school and a selected bibliography on industrical education.

Annual Report of the Inspector of Technical Education, 1909. Printed by the Order of the Legislative Assembly of Ontario. Toronto, 1910.

This report, drawn up by Mr. Leake, is very rich in illustrations, both of industrial arts and of household arts. It will be of interest to classes in methods of teaching the household arts.

Bibliography of Household Arts.

A bibliography of selected reference books in the field of household arts is to be published by the School of Household Arts, Teachers College, about the first of December. It will be made available for general use at a small price covering the cost of printing. This is in line with the policy of the school to print a series of small pamphlets to include subject-matter which needs to be made available for the use of students. The first publication of this sort was Dr. Devine's paper, The Economic Function of Woman, which was reprinted in October, and which is available for use in other institutions at ten cents a copy, with a discount in quantities.

"Euthenics." The Science of Controllable Environment. A Plea for Better Living Conditions as a First Step Toward Higher Human Efficiency. Ellen H. Richards. Whitcomb and Barrows, Boston, 1910. 162 pages.

This, the latest of Mrs. Richards' books, presents a philosophy of the Home Economics movement. Many members of our Association will recall that "Euthenics" is a term born of the meetings at Lake Placid. "Eugenics deals with race improvement through heredity." "Euthenics deals with race improvement through environment." ''Euthenics is hygiene for the present generation."

For many years, Mrs. Richards has been one of the leaders in American work in hygiene in the field, especially, of safeguarding water supplies and establishing pure food standards. A volume is just coming from the press which brings to a focus her purely scientific work in these fields of chemical research and instruction. Along with her work as a chemist, however, has gone her interest in the improvement of the American home. One recalls her long list of books, among others, "The Art of Right Living," "The Cost of Living," "The Cost of Food," "The Cost of Shelter," "The Cost of Cleanness." Now comes this volume on "Euthenics" which relates in a definite way the activities known to us as "Home Economics," to the general movement for the conservation of life and health, and to the scientific movement of the last quarter-century which has endeavored to bring all the resources of science to bear for the betterment of human life.

"Euthenics" gives a simple, intelligible view of all these related movements. They all mean a better control of environment for the purpose of increasing human efficiency. In this controlled environment the work of the housewife looms large.

Given as a table in the appendix we find the schedule of agencies contributing to a better common life. Its grouping shows a statesman like vision, and the reader is impressed with the fact that however slowly this outline may be filled out with effective work by the public, such coöperation will be largely the result of the foresight and labors of such leaders as Mrs. Richards.

B. R. ANDREWS.

Proceedings of the Third International Congress for Home Education.

These proceedings comprise eight volumes in which the greatest specialists in pedagogy discuss the study of childhood, the education of children before, during, and after their school years, the education of abnormal children, and the various subjects relating to childhood. The exchange of opinions which was evoked at the Congress by the papers presented will be published in a separate volume, the ninth in the series which appear shortly. The ninth volume will be sent to all persons registered with the Secretary General of the Congress, L. Pien, 44 Rue Rubens, Brussels, Belgium, before January 1, 1911. Such persons will be considered members of the Congress and will receive the nine volumes upon payment of the dues, 10 francs ($2). After that date these publications will be found only in the hands of booksellers at a price considerably higher.

These nine volumes contain more than 300 articles. A certain number of papers —in the neighborhood of 100—were not received by the Bureau in time for publication. The members of the Congress will find these reviewed in the *Revue de l'Education familiale*, of which sample copies may be obtained free of charge by applying to the Secretary General as mentioned above.

Probably the Fourth International Congress for Home Education will be held in the United States. A commission has been appointed to take the matter under consideration. Professor Monroe of the State Normal School, Montclair, N. J., was appointed Secretary of this commission.

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